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Insomnia symptoms in elderly persons

Assessment, associated factors and
non-pharmacological nursing interventions

Amanda Hellström



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DOCTORAL DISSERTATION

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To be defended at SSSH-salen, Health Science Center, Baravägen 3 Lund
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Associate Professor David Edvardsson,

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<p>Abstract</p> <p>The aim of this thesis was to test a tool for assessing insomnia symptoms in elderly persons and to investigate late-life insomnia in terms of associated factors and evidence of non-pharmacological interventions in health care settings. Data were collected by means of a systematic literature search (Study I), questionnaires (Studies II-III), interviews and observations (Study IV). The results from Study I are based on nine studies, identifying six non-pharmacological interventions. Evidence for the interventions was limited. However, individual studies showed moderate to large effect of the interventions on several sleep outcomes. In Study II, measurement properties of the Minimal Insomnia Symptom scale (MISS) were tested on 497 elderly persons. Corrected item-total correlations were 0.64-0.70, floor/ceiling effects were 6.6/0.6% and reliability 0.81. Using a cut-off score of ≥ 7 points, sensitivity and specificity were 93/84%. MISS was found feasible as a screening tool for insomnia in the elderly.</p> <p>Investigating associations between leisure activities and sleep disturbances (Study III), gardening, strolling in the country, home maintenance, repairing cars/machines and playing chess/cards were associated with fewer sleep disturbances in elderly persons. Adjusting for age, gender, general health, functional ability and mood, only playing chess/cards remained statistically significant. Investigating gender differences by adding interactions to the model, only home maintenance was statistically significant and seemed to be especially important for women. In residential care facilities (RCFs) several residents perceived their sleep to be longer and more regular since moving in. Having preserved their pace of life seemed of importance of sleep. However, less mobile residents were more inactive and spent more time in the day room slumbering.</p> <p>In conclusion, MISS was found to be a reliable tool for initial screening of insomnia in the elderly. Evidence for non-pharmacological sleep interventions, induced and performed by nurses is limited. Playing chess/cards or doing home maintenance was associated with having fewer sleep disturbances and could act as self-care strategies for sleep disturbances. In RCFs, remaining independent, having privacy and solid rhythms seemed to positively affect sleep. This also implies that less mobile residents should be a concern, since they have fewer opportunities to privacy and more seldom initiate activities and social interaction.</p>		
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“Sleep that knits up the raveled sleeve of care,
the death of each day’s life, sore labour’s bath,
balm of hurt minds, great nature’s second course,
chief nourisher in life’s feast.”

Shakespeare

Contents

Abstract	9
Abbreviations and definitions	11
Original papers	13
Introduction	15
Background	17
Defining insomnia.....	17
Prevalence of insomnia symptoms in the general population.....	18
Defining old age.....	18
Normal sleep.....	19
Sleep stages and diurnal rhythms.....	19
Sleep in the elderly.....	20
Insomnia in the elderly.....	22
The concept of sleep quality.....	23
Factors affecting sleep.....	23
Sleep assessment.....	27
Management of sleep disturbances.....	29
Pharmacological methods.....	29
Non-pharmacological methods.....	30
Scientific outline for the thesis.....	34
Rationale.....	35
Aims	37
Methods	39
Design.....	39
Samples and context.....	40
Data collection.....	42
Literature search.....	42

Observations.....	44
Interviews	44
Measures.....	44
Analysis	49
Evidence strength	49
Statistical analysis.....	50
Qualitative content analysis	52
Ethical considerations.....	53
Results	55
Evaluation of the effects of non-pharmacological nursing interventions	55
Music/natural sounds or viewing instrumental music videos	55
Massage	55
Acupunctural stimulation	56
Sleep hygiene.....	56
Measuring insomnia symptoms in the elderly	57
Activities linked to sleep disturbances	62
Gender differences in relation to sleep	66
Discussion	67
Methodological considerations	67
Reliability	67
Validity.....	69
Trustworthiness	73
General discussion of the results	74
Conclusions and clinical applications	79
Further research	81
Summary in Swedish/ Svensk sammanfattning	83
Acknowledgements	87
References	89

Abstract

The aim of this thesis was to test a tool for assessing insomnia symptoms in elderly persons and to investigate late-life insomnia in terms of associated factors and evidence of non-pharmacological interventions in healthcare settings. Data were collected by means of a systematic literature search (Study I), questionnaires (Studies II-III), interviews and observations (Study IV). The results from Study I are based on nine studies and six non-pharmacological interventions were found. Evidence for the interventions was limited. However, massage, acupunctural stimulation and listening to music/natural sounds or watching an instrumental music video showed a moderate to large effect on several sleep outcomes. In Study II, the measurement properties of the Minimal Insomnia Symptom scale (MISS) were tested on 497 elderly persons. Corrected item-total correlations were 0.64-0.70, floor/ceiling effects were 6.6/0.6% and reliability 0.81. Using a cut-off score of ≥ 7 points, sensitivity and specificity were 93/84%. MISS was found to be feasible as a screening tool for insomnia in the elderly.

An investigation of associations between leisure activities and sleep disturbances (Study III) showed that gardening, strolling in the country, home maintenance, repairing cars/machines and playing chess/cards were associated with fewer sleep disturbances in elderly persons. Adjusting for age, gender, general health, functional ability and mood, only playing chess/cards remained statistically significant. After interactions between gender and leisure activities were added to the model, only home maintenance was statistically significant. The ability to pursue home maintenance seemed to be particularly important for women. Investigating sleep and everyday activities at residential care facilities (RCFs) revealed that the punctual scheduling of meals and coffee times helped to maintain a regular rhythm and limit daytime sleep (Study IV). Several residents perceived their sleep to be longer and more regular since moving in. Less mobile residents would spend most of the day in the day room, with less activity and without the possibility of withdrawing. Slumbering in the day room was common. Residents who were mobile spent more time in the privacy of their apartments, pursuing activities on their own.

In conclusion, evidence for non-pharmacological sleep interventions is limited. Socio-intellectual activities, such as playing chess/cards or doing home maintenance, were associated with fewer sleep disturbances. Less dependent persons benefitted from the structured day at the RCF, they performed solitary activities to a large extent and they

felt their sleep had improved. MISS was found to be a reliable tool for initial screening of insomnia in the elderly, and could be useful in clinical practice.

Abbreviations and definitions

CABG	Coronary Artery Bypass Graft
CASP	Critical Appraisal Skills Programme. Templates developed by the Public Health Resource Unit in the United Kingdom, used to evaluate the scientific quality of research studies.
CBT	Cognitive Behavioural Therapy
GRADE	A system used for compiling and assessing evidence of research findings. It consists of a four-grade scale, offering a systematic approach to evaluating quality of evidence and strength of recommendation.
IADL	Instrumental Activities of Daily Living
ICU	Intensive Care Unit
MISS	Minimal Insomnia Symptom Scale
MMSE	Mini Mental State Examination
MNA	Mid-night awakenings
Nursing intervention	Any treatment based on clinical judgement and knowledge that a nurse performs to enhance patient/client outcomes.
RCF	Residential Care Facility. An umbrella term for nursing homes, sheltered housing, assisted living facilities and care facilities for the aged.
SCN	Suprachiasmatic nucleus, also called the “biological clock”. It is the centre of the circadian rhythm.
Sleep deprivation	Loss of sleep. To be deprived of the opportunity to sleep.

Sleep disorders	A group of syndromes characterised by disturbance in the amount, quality or timing of sleep or in behaviours or physiological conditions associated with sleep. To be considered a sleep disorder, the condition must be a persistent problem, cause significant emotional distress and interfere with social or occupational functioning.
Sleep efficiency	The time spent asleep divided by the time spent in bed. Usually reported in per cent, good sleep efficiency is $\geq 85\%$.
Sleep onset latency	The time it takes from going to bed through to falling asleep.
Sleep quality	A sleep measure related to experienced insomnia symptoms, such as the occurrence of non-restorative sleep.
SNAC-B	Swedish National Study on Aging and Care – Blekinge.

Original papers

- I. Hellström, A., Fagerström, C. & Willman, A. (2011). Promoting sleep by nursing interventions in health care settings: A systematic review. *Worldviews on Evidence-Based Nursing*. 2011, 3rd quarter: 128-142.
- II. Hellström, A., Hagell, P., Fagerström, C. & Willman, A. (2010). Measurement properties of the Minimal Insomnia Symptom Scale (MISS) in an elderly population in Sweden. *BMC Geriatrics*, 10:84.
- III. Hellström, A., Hellström, P., Willman, A. & Fagerström, C. (2013). Association between sleep disturbances and leisure activities in the elderly: A comparison between men and women. (Accepted for publication in *Sleep Disorders*).
- IV. Hellström, A., Condelius, A., Willman, A. & Fagerström, C. (2013). The rhythm of the unit is the pace of life: a study of everyday activities and sleep in Swedish residential care. (Submitted).

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Introduction

Sleep is considered to be a basic physiological need (Rosenthal, 2006) and is an essential function. It impacts on learning, memory (Bushey & Cirelli, 2011) and cognitive functions (Killgore, 2010). Furthermore, sleep has implications for the immune system, regulation of hormones, metabolism and thermoregulation (Cirelli & Tononi, 2008; Frank, 2006) as well as daytime functioning, well-being and the capacity to handle daily stressors (Vandekerckhove & Cluydts, 2010). Sleep deprivation causes detrimental and rebound effects in exposed persons and total sleep deprivation is found to be fatal (Cirelli & Tononi, 2008). It is therefore important to have clinically usable tools for detecting sleep disturbances and strategies for managing the disturbances. It was emphasised as far back as the 1950s that tension and stress could be possible causative factors for sleep disturbances among the ill. By increasing the well-being of the patient or by modifying the environment, it was suggested that sleep could be enhanced (Henderson, 1997). A non-pharmacological approach to sleep disturbances was thus suggested.

Sleep alterations, such as less deep sleep (N3) and increased light sleep (N2), are common with age (Morin et al., 1999). Due to these changes, nocturnal awakenings and spending more time in bed awake increases, which results in decreased sleep efficiency. Natural sleep alterations could be amplified by morbidity and cultural and social factors (Fetveit, 2009; Montgomery & Dennis, 2004; Tsai et al., 2008), thus making the elderly more vulnerable to external disruptions. This is applicable in particular to elderly persons in hospitals and residential care facilities (RCFs).

Sleep quality is defined as restorative sleep without nocturnal awakenings, ease of falling asleep and no need for daytime sleep (Harvey et al., 2008; Zilli et al., 2009). Insomnia is characterised by difficulty falling asleep, nocturnal awakening and non-restorative sleep leading to daytime impairments (Broman et al., 2008; Ohayon, 2002), i.e. counteractive to sleep quality. Transient insomnia (lasting a few days) might cause sleepiness and impair psychomotor performance. Chronic insomnia (>1 month) could lead to memory impairment, depression and increased healthcare utilisation (Roth & Roehrs, 2003). Studies of elderly persons with insomnia have shown an increased risk of falling (Roepke & Ancoli-Israel, 2010; St George et al., 2009) and low physical functioning (Roepke & Ancoli-Israel, 2010). In care environments, such as hospitals or RCFs, sleep disturbances can be amplified by pain, illness, anxiety, noises or the care itself (Isaia et al., 2011; Redeker et al., 2011). Co-

morbidity or frailty, coupled with less physical activity, could further complicate sleeping (Gordon & Gladman, 2010; Herrmann & Flick, 2011).

Since sleep disturbances commonly occur in stressful or new environments, or together with illness conditions, nurses need to be aware of this and the detrimental effects sleep disturbances can have on somatic and mental functioning (Lee et al., 2004). There are several non-pharmacological interventions that can be suggested in order to improve sleep or prevent sleep disturbances from occurring. However, the effectiveness and appropriateness of these interventions are inconclusive and need to be investigated further. Moreover, it is important to identify and use clinically relevant instruments for sleep assessment. There are various instruments available depending on the characteristic and the target group under investigation. Components of particular interest to the clinician could be the length of an instrument, the scoring system and the cut-off values. The latter may vary between target groups, underlining the importance of testing an instrument among persons who fit into the target group.

Background

Defining insomnia

According to the International Classification of Sleep Disorders, second edition (ICSD-2), the diagnosis of insomnia is based on a subjective report of difficulties initiating sleep, maintaining sleep due to nighttime or early morning awakening or non-restorative sleep, despite ideal sleep conditions, leading to daytime impairments (Broman et al., 2008; Ohayon, 2002). Insomnia can be related to an underlying somatic or psychic disease or pharmaceutical use (Wolkove et al., 2007). Defining insomnia is complex, since it occurs as a symptom, a disorder or both. Furthermore, there are several subtypes of insomnia, varying in duration and aetiology. However, there is a consensus that insomnia includes at least one sleep symptom and one waking symptom. The former may be difficulty initiating or maintaining sleep, early morning awakening, non-restorative sleep or non-refreshing sleep. Waking symptoms are sleepiness, fatigue, cognitive impairment, mood disturbances, occupational or social impairments (Lichstein et al., 2011).

Misconceptions about sleep are common in persons with insomnia. A person with insomnia often has physiological and cognitive arousals that are associated with sleep and sleep environment (Roehrs, 2000). The negative thoughts that trigger autonomic arousal and emotional stress capture the person in an anxious state. The person loses the ability to perceive the amount of sleep obtained adequately and tends to exaggerate impairment of daytime performance (Harvey, 2002). This vicious circle of thoughts might, if the person does not seek help, lead to chronic insomnia.

It has been hypothesised that insomnia is a hyperarousal disorder (Roth & Roehrs, 2003). There are several theories about the role of hyperarousals in insomnia. The general idea is that acute insomnia occurs in association with predisposing and precipitating factors (such as psychosocial stressors), while the chronic form of insomnia develops in the presence of perpetuating factors. The arousals are somatic, cognitive and cortical forms of activation and the bed and the sleep environment become the stimuli for those arousals (Bonnet & Arand, 2010). This hypothesis is also in line with the role of dysfunctional beliefs about sleep in the development of chronic insomnia, as described earlier (Harvey, 2002; Roehrs, 2000). Insomnia is fuelled by enhanced sensory processes at sleep onset, where the bed and bedroom are

associated with negative beliefs about sleep. The room in which the person sleeps is of great concern. Acting on basic sleep hygiene advice is therefore of importance. This applies especially to nurses caring for persons who cannot attend to this themselves.

Prevalence of insomnia symptoms in the general population

Approximately 30-60% of the general population in the industrial world suffer from insomnia symptoms (Kamel & Gammack, 2006; Morin et al., 2006; Ohayon & Paiva, 2005), of whom 10-20% have chronic insomnia (Ancoli-Israel, 2006). Women report insomnia symptoms more often than men and this is valid for all age groups. Furthermore, the chronic form of insomnia is more common in women (Soares, 2005). In a study by Ohayon and Bader (2010) investigating the prevalence of insomnia symptoms in the general population in Sweden (19-75 years) around one-third had insomnia symptoms ≥ 4 times/week. The prevalence of at least one insomnia symptom was higher in women (38.3%) than in men (26.1%). The higher prevalence of insomnia symptoms in women is further supported by findings from studies performed in Brazil, Africa and Asia (Santos-Silva et al., 2010; Stranges et al., 2012). Santos-Silva et al. (2010) also showed an increasing insomnia trend over a 20-year period in persons between 20 and 80 years of age. This implies an increasing health problem. In the study by Stranges et al. (2012), comparing persons aged ≥ 50 years in eight African and Asian countries, sleep disturbances were more common among women and among the oldest persons. However, the age effect was attenuated when the model was adjusted, showing that it is not age *per se* but what might arise with ageing, such as co-morbidities and poor health, that mainly contributes to the effect.

Defining old age

Old age is a vague concept and varies over time and between individuals and between cultures (van den Heuvel & van Santvoort, 2011). In Europe, as in most of the developed world, the chronological age of 65 years has been accepted as a definition of elderly or old age. However, this cut-off point fits poorly into situations in developing countries. The United Nations (UN) has therefore agreed on a cut-off point of 60+ years when referring to elderly persons (World Health Organisation [WHO], 2013a). Contrary to the developed countries, the developing world places a stronger emphasis on socially constructed meanings of age rather than chronological age. Such social constructions may be roles or physical decline.

In the European Social Survey investigating ageism, a definition of old age was sought. Persons aged 15 and over in 28 European countries were asked at what age

they considered a person to be 'old'. The respondents were clustered into three age groups (15-39 years, 40-64 years and 65 and above). The mean age for 'old' as derived from the survey was 62 years and varied modestly between the ages of the respondents (60.7-63.8 years), indicating a consensus on the age when one becomes old (van den Heuvel & van Santvoort, 2011). Since there is a lack of general agreement on the age at which a person becomes old, the age at which a person becomes eligible for a state or occupational retirement pension has become the default figure. In developed countries, chronological time is paramount and the ages of 60 or 65 are commonly used as determinants of old age, since these ages roughly correspond to retirement (WHO, 2013a). In this thesis, the term 'elderly persons' means persons ≥ 60 years of age.

Normal sleep

Sleep can be defined as "*a reversible behavioural state of perceptual disengagement from and unresponsiveness to the environment*" (Carskadon & Dement, 2011). Having closed eyelids, reduced movement, reduced responsiveness to stimuli and a recumbent body posture are characteristic sleep behaviours. The sleep state is distinguished from unconsciousness and rest by the fact that sleep is a naturally or easily reversed state, unlike the state of unconsciousness. Rest may resemble sleep behaviours such as reduced movement and recumbent posture although it does not reduce tiredness and the person does not feel refreshed the following day (Landis, 2011).

Sleep stages and diurnal rhythms

Human sleep comprises two distinct states: non-rapid eye movement sleep (NREM) and rapid eye movement sleep (REM). NREM sleep can be divided into three stages (N1, N2, N3) depending on the depth of the sleep. Stage N3 comprises slow wave sleep (SWS) and is the deepest of the sleep stages (Rama et al., 2006). Deeper sleep is manifested through larger and slower brain activity (Landis, 2011). As nursing care is provided around the clock, sleep disturbances are a concern for nurses. It is therefore important to understand the processes underlying sleep and the stages of sleep, as this understanding has implications for the timing of care provision (Lee et al., 2004). An example of this understanding is a study by Hertzog et al. (2013), revealing that plasma glucose among young healthy men increased after SWS suppression and insulin sensitivity was reduced (Herzog et al., 2013). Although the authors (Herzog et al., 2013) stress the difficulties involved in generalising the findings in an elderly population, it was emphasised that glucose should be monitored in populations known to have disturbed SWS, such as the elderly. Another inference is that since

SWS occurs mainly during the first half of the night, planned care interventions should be provided at bedtime or during the second half of the night.

Sleep is a cyclical process, where the NREM-REM stages supersede each other in periods of approximately 90 minutes. About 4-6 sleep cycles occur during each sleep period, (i.e. one night) (Rama et al., 2006). The composition of the sleep cycles changes over the course of the night with a decrease in the amount of SWS and an increase in REM sleep (Waterhouse et al., 2012). Sleep regulation is thought to be controlled by two processes; the sleep-dependent homeostatic process (process S) and the sleep-independent process (process C) (Achermann & Borbely, 2003). A third, the ultradian process has also been suggested. This process controls the switches between NREM and REM sleep during the sleep cycles (Roehrs, 2000).

Process S depends on prior sleep and waking. There is an exponential rise during waking and a decline during sleep. Process S is linked to sleep propensity; the longer a person stays awake, the stronger the sleep propensity. When the person finally goes to sleep the pressure to stay asleep decreases (Rama et al., 2006). The circadian rhythm, which is regulated from the suprachiasmatic nucleus (SCN) in the brain, is linked to the regulation of core body temperature and levels of melatonin and cortisol (Borbely & Achermann, 2000). The SCN in the hypothalamus serves as the central pacemaker of the biological clock. The clock is synchronised mainly by environmental light. Environmental light hits the retina, where a link to the SCN conveys information about light levels and thus synchronises the light-dark cycle (Achermann & Borbely, 2003; Roehrs, 2000; Rosenthal, 2006). Compensation for lost slow wave sleep takes place mainly through an increase in sleep intensity rather than prolonged sleep (Achermann & Borbely, 2003; Rosenthal, 2006). As demonstrated, knowledge of the circadian rhythms and the sleep cycles is of importance when planning and providing care. Depending on the timing of care, diurnal rhythms may be enforced or counteracted.

Sleep in the elderly

As a person becomes older, the circadian rhythm is flattened and may also be phase-advanced with earlier bedtime and earlier morning awakenings (Redeker, 2011). Elderly persons usually have lower sleep efficiency with less stage N3 sleep and more arousals (Bliwise, 1993; Redeker, 2011) (Figure 1). The changes in the circadian rhythm may be associated with age-related deterioration of the SCN (Redeker, 2011). Another view suggested by Bliwise (1993) is that fewer activities and frequent naps during the day may contribute to the changes, which could lead to perceived poor sleep quality (Bliwise, 1993). For some individuals, napping may interfere with nocturnal sleep, while for others it may compensate for lost nocturnal sleep.

Investigating a nap intervention in healthy persons 50-83 years of age, it was shown that nocturnal sleep was not affected by taking naps and although sleep onset latency increased, the naps did improve neurobehavioural performance (Campbell et al., 2011). On the other hand, Goldman et al. (2008) found napping to be associated with sleep fragmentation, fatigue, pain and diabetes among persons who were 80 years of age. Picarsic et al. (2008) also found associations between napping and diabetes, high body mass index and cognitive impairment as measured by MMSE. The cause and effect relationship has not been established (Goldman et al., 2008). It is plausible that napping is the consequence of a somatic or psychiatric illness rather than the cause (Redeker, 2011).

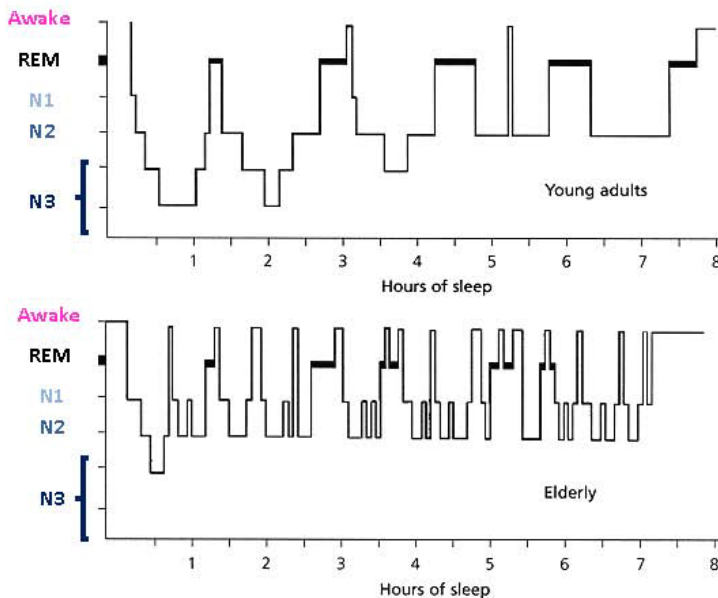


Figure 1. Hypnograms showing the sleep of healthy young and old adults (Neubauer, 1999). The sleep stages have been modified in this thesis to correspond to the classification of NREM sleep currently used today.

Poor sleep is commonly regarded by the elderly as being part of normal ageing and this might also be reinforced by healthcare staff during consultations. Venn and Arber (2012) found that elderly persons felt that discussing sleep disturbances was a waste of the physicians' limited and valuable time. Another reason for not mentioning sleep disturbances was the fear of having sleep medication or tranquilisers prescribed. Such medication was perceived as harmful and addictive and implied a weakness of character. Such problems were therefore avoided by the patients when they saw the physician (Venn & Arber, 2012), leaving sleep disturbances unaddressed. Nurses commonly fill the void left by the subjects and issues the patient does not discuss with the physician (Carnevali, 1983). Nurses should encourage patients to talk about their

sleep and strive to break the common belief that difficulty sleeping is a natural part of ageing. It is important that sleep disturbances are considered to be real health problems that are of concern for the healthcare system.

Insomnia in the elderly

About 12-39% of persons ≥ 65 years suffer from chronic insomnia (Kim et al., 2009; Morin et al., 1999; Mousavi et al., 2012), which is slightly higher than for the general population (10-20%) (Ancoli-Israel, 2006). In a study by Foley et al. (2004) covering 1,506 persons aged 55-84 years and living in the community, it was found that about 80% reported a long-term medical condition and 25% of those aged 65-84 years had four or more long-term medical conditions. The perception of sleep quality was linked to the number of long-term medical conditions. Bodily pain, heart disease, memory impairment and depression were associated in particular with experiencing symptoms of insomnia (Foley et al., 2004). Furthermore, frequent visits to the physician and a sedentary lifestyle were associated with more sleep disturbances. It can be concluded that painful conditions and somatic and psychiatric illnesses are related to sleep disturbances as well as an inactive life. However, it is not clear if the inactivity depends on the somatic and psychiatric state of the person, thus worsening the sleep disturbance, or if they are independent of each other.

A common reason given by relatives for moving to an RCF has been the presence of insomnia (Wade, 2010). Sleep deprivation has also been proven to cause changes in the metabolism of glucose as well as a change in the levels of hormones essential for the metabolic processes, leading to increased risk of diabetes, hypertension and obesity (Cauter et al., 2008; Motivala et al., 2009; Spiegel et al., 1999). Furthermore, a link between insomnia and an increased risk of falling, cognitive impairments and low physical functioning has been observed in elderly persons (Roepke & Ancoli-Israel, 2010). It is not uncommon for elderly persons to suffer from one or more long-term medical conditions that can cause or contribute to sleep disturbances (Ancoli-Israel & Cooke, 2005). A medical diagnosis, such as arthritis, cancer, cardiovascular disease or Parkinson's disease (Ancoli-Israel et al., 2008), as well as comorbidity, use of medication or other primary sleep disorders, have been associated with poor sleep quality (Bliwise, 1993; Foley et al., 1995). However, in a study by Eser et al. (2007), no significant differences in sleep quality between elderly persons with and without health problems were found. Common sleep disturbances among elderly persons include waking at night and longer periods of wakefulness before falling asleep again (Foley et al., 1995; Roehrs, 2000; Åkerstedt, 2002). A longitudinal Australian study of women aged 70-75 years showed that women who had insomnia symptoms risked severe health problems and decreased quality of life (Byles et al., 2003). It seems clear that late-life insomnia can result in severe health

problems, social impairments and increased healthcare utility. Insomnia is thus an important issue to address.

The concept of sleep quality

Sleep quality is accepted as a clinical construct and is a complex phenomenon that is difficult to capture through objective measures (Buysse et al., 1989). As there is no clear definition of sleep quality, Harvey et al. (2008) interviewed persons with and without insomnia, asking for their definition. The results showed that both groups associated good sleep with the absence of tiredness on awakening, feeling refreshed and restored by sleep, no awakenings during the night and no daytime sleepiness (Harvey et al., 2008). Buysse et al. (1989) suggest that sleep quality includes quantitative measures, such as sleep duration, sleep onset latency and arousals, as well as qualitative aspects, such as the restfulness of sleep. The description of sleep quality by Buysse et al. (1989) shows a link between the concept and insomnia. An Italian study describing perceived sleep satisfaction in elderly persons (65-99 years) found that satisfaction came from calmness of sleep, ease of falling asleep, ease of awakening, feeling refreshed by sleep and sleep duration (Zilli et al., 2009). A common feature of the above descriptions is the aspect of restorative sleep. It is thus possible that questions that address non-restorative sleep may provide some indication of perceived sleep quality. Moreover, Harvey et al. (2008) found links between sleep quality and mid-night awakenings (MNA), while Zilli et al. (2009), investigating elderly persons, did not. This might seem puzzling, since MNA is the major sleep complaint in elderly persons. Non-restorative sleep on the other hand is reported mostly by young adults (19-44 years) (Ohayon & Bader, 2010). However, MNA is also a common feature of non-pathologically altered sleep in elderly persons. This could explain why elderly persons find MNA acceptable to a greater degree and thus do not relate MNA to sleep quality. Even though sleep quality is a complex concept, the definitions coincide with absence of insomnia. Another way of putting it would be to say that sleep quality and insomnia are the opposites of each other.

Factors affecting sleep

There are predisposing, precipitating and perpetuating factors in sleep disturbance. These factors can be divided roughly into behavioural, social, psychological, biological and environmental. Some factors are out of reach for the nurse to act on, whilst others should definitely be considered when caring for another human being. Previous/present lifestyle and the environment contribute to current health status.

Knowledge of risk factors and knowledge of the person's daily living patterns could be analysed and used to prevent poor health (Carnevali, 1983). Carnevali (1983) states that nurses can influence daily living activities and the immediate environment of the patients/residents. Nurses should therefore work to shape activities and environments that foster health and minimise risk factors for poor health (Carnevali, 1983). Although social and physical activities have been shown to enhance sleep (Richards et al., 2005), these are broad concepts. The question of effectiveness and appeal remains.

The main behavioural factors affecting sleep are caffeine, nicotine, alcohol, diet and exercise (Morin & Espie, 2004). Missing breakfast and smoking tobacco are found to have a negative effect on sleep in women (Kawada et al., 2003; Soltani et al., 2012). In a study of elderly (mean age 79.5), better sleep was associated with short naps, exercise three or more times per week and walking regularly. Food also differed between good and poor sleepers, where good sleepers ate more seaweed and fish. Attending senior citizen clubs and social engagement were also shown to be associated with better sleep (Taira et al., 2002). Performing exercise is associated with improved sleep quality among women compared to having a sedentary lifestyle (de Castro Toledo Guimaraes et al., 2008; Soltani et al., 2012). The findings underline the effect of lifestyle on sleep, especially in women.

Psychological factors such as anxiety and depression occur to a greater extent in women, making this particularly important when addressing insomnia in women (Krystal, 2003; Soares, 2005). In a study of persons aged >65, difficulty initiating sleep was found to precede depression three years later (Yokoyama et al., 2010). Early morning awakening is common among the elderly due to the natural changes in sleep and can thus not be used as a reliable criterion for depression in this group. However, unresolved insomnia is assumed to increase the risk of developing depression (Ancoli-Israel et al., 2008). In elderly persons, factors such as loneliness, bereavement, retirement, fear of dying while sleeping and traumatic events (the holocaust) were found to be related to insomnia (Bliwise, 1993; Cacioppo et al., 2002).

Gender, age and ethnicity are biological factors related to the prevalence of insomnia. Risk factors for insomnia are more difficult to pin down although gender, age, ethnicity, genetics and co-morbidities (somatic and psychological) have been suggested as examples (Lichstein et al., 2011). Morbidities, such as pain or nocturia, and use of pharmaceuticals, together with changes in the circadian rhythm are cited as contributing to sleep disturbances among the elderly (Ancoli-Israel et al., 2008; Bloom et al., 2009). It has been suggested that changes in SCN observed in relation to old age (i.e. a decrease in amplitude and stability in process C) might be reversible through the effects of environmental factors (van Someren, 2000). Bulechek and McCloskey (1999) claim that nursing interventions aimed at sleep enhancement are supposed to recreate comfortable patterns of sleep and wake, implying that interventions should be directed towards the processes that regulate sleep. Facilitating

regular sleep/wake rhythms can be accomplished through both pharmacological and non-pharmacological interventions (Bulechek & McCloskey, 1999). The ageing process of the eyes also impacts on sleep. While the cornea and lens grow more opaque, light transmission, especially shorter wavelengths (blue) decreases. Impaired eyesight not only impacts directly on the light levels transmitted to the SCN (Roehrs, 2000), it could also impede performance of daytime activities, such as reading or spending time outdoors (Waterhouse et al., 2012).

Gender has been quoted as a predisposing factor for insomnia and being female carried an increased risk of social and psychological precipitating factors for insomnia. Previous research investigating gender differences has focused mostly on the effect of reproductive hormones on the sleep of women (Baker et al., 2009; Minarik, 2011). In men, an association between frailty and sleep disturbances was observed by Ensrud et al. (2009), who showed that becoming older, declining health, co-morbidity, use of benzodiazepines and anti-depressives, living alone and being dependent in IADL were some of the factors that caused frailty and increased sleep disturbances. It appears that frailty, a condition comprising several impairments, should be considered when investigating sleep disturbances in men (Ensrud et al., 2009).

Environmental factors affecting sleep are comfort of bed and pillow, room temperature, light and noise levels (Morin & Espie, 2004). It has been noted that women seem to be affected more by environmental noise than men (Soares, 2005). If these factors are transferred to a hospital or RCF, the design of the unit becomes of great importance. The nurse has a key role to play in such an environment, attending to the basic needs of the patient/resident, including nocturnal sleep. Modification of the environment has been suggested, such as eliminating stimuli that could be perceived as disturbing and ensuring the patient is not hungry (Henderson, 1997). Henderson emphasises the importance of creating a supportive environment (Wills, 2007). Supportive environments, signified by small-scale units with a familiar and non-institutional atmosphere (harmonious colour scheme and access to daylight and outdoor environment), are also found to reduce stress (Edvardsson 2005). Since stress is considered to be a major contributor to insomnia (Åkerstedt et al., 2011), it is extremely important that environmental factors are taken into account. This could be achieved by creating calmness for the patient, with reduced noise and light levels and relaxing activities before bedtime (Henderson, 1997). This could also include exposure to daylight, since light levels affect the functions of the SCN (Waterhouse et al., 2012).

Care environments that have been focused on in particular in this thesis are hospitals and RCFs. According to Hoffman (2003), almost two-thirds of persons living in RCFs experience sleep disturbances and this number is similar in acute care settings. Sleep disturbances are usually identified through self-reports although many elderly persons tend to accept sleep changes, believing them to be part of normal ageing. The

reluctance shown by many elderly persons to report sleep disturbances results in untreated sleep disturbances that could ultimately have a considerable effect on health (Hoffman, 2003). In institutional settings, the nurse could have a particular responsibility to see the environment from a patient perspective and to analyse the environment from the point of view of diagnosis and planning management (Carnevali, 1983). Since the nurses are familiar with the institutional environment, this could result in them being 'blind and deaf' to the patients' perspective. It is particularly important to take into account the differences between the usual setting of the patient and the institution. Nurses need to be aware of the environment that is created and controlled by the staff, such as light, noise, colours, cleanliness, odour, traffic, privacy and temperature (Carnevali, 1983). Carnevali wrote thirty years ago, which could imply that this issue is obsolete for the nurses of today. However, is it certain that staff are fully aware of environmental aspects? A further aspect is whether nurses in today's healthcare system are not only aware but also act. One indicator of action could be the use of sleep hygiene protocols in the care environment.

In acute and critical care settings, changes in sleep patterns and an increase in sleep disturbances have been reported. Some of the causative factors can be found in the environment, such as lighting, patient care interactions and noise. Usually, there is an increase in N1 sleep and a decrease in deeper sleep stages. Earlier bedtimes and early morning awakenings are described. Some persons experience sleep deprivation whilst others have a sufficient amount of sleep, although the quality of sleep is often poor (Redeker et al., 2011). In a study by Isaia et al. (2011) sleep in persons ≥ 65 years admitted to an acute geriatric care unit was investigated. Of 218 persons admitted over a six-month period, 80 (36.7%) reported sleep disturbances. Most commonly, the disturbances were caused by noise from other patients, alarms, coughing, visitors, nurses and flushing toilets. Noise, anxiety and pain were reported to cause a great deal of environmental stress (Isaia et al., 2011). The findings imply that more needs to be done to create a sleep-promoting environment.

Among elderly persons living in RCFs, 60.9% were found to have low sleep quality (< 5 Pittsburgh Sleep Quality Index) (Eser et al., 2007). Women experienced lower sleep quality than men, which has also been confirmed in several other studies (Broman et al., 1996; Marquie & Foret, 1999; Philips et al., 2008). Living alone, having a single room, not exercising and taking naps regularly were also associated with low sleep quality (Eser et al., 2007). The sleep of persons living in RCFs has been characterised as non-restorative, with early awakenings in the morning, long sleep onset latency, low sleep efficiency and naps during the day (Bloom et al., 2009; Voyer et al., 2006). At night, it is not uncommon for sleep to be interrupted by discomfort, light and noise (Bloom et al., 2009). This confirms the findings of a previous American study, where all nursing routines at night were accompanied by changes in light and noise levels (Alessi & Schnelle, 2000). However, there is a lack of

national research on the impact of the nursing organisation and nursing routine on sleep disturbances (Swedish Council on Health Technology Assessment, 2010).

In summary, the factors affecting sleep are diverse. Some factors or circumstances cannot be avoided and instead a person may need advice and help to live and act under such conditions. Other factors, such as the timing and consumption of stimulants and meals and activity routines, are factors commonly included in sleep hygiene advice and are changeable. These factors are also of particular concern in care environments, where it is the care staff who are in control of the routines and the daily schedule. Another concern for hospital patients as well as persons in residential care facilities is having their sleep disturbed by noise and the nursing routines (Alessi & Schnelle, 2000) as well as by pain, needing to go to the toilet or discomfort (Ersser et al., 1999). The condition of the patient, the care environment and the timing of nursing interventions should thus be considered in order to avoid or reduce sleep disturbances.

Sleep assessment

Traditionally, polysomnography (PSG), a combination of electroencephalography, electrooculography and electromyography, has been regarded as the gold standard for sleep measurements (Bourne et al., 2007). An alternative to PSG is the actigraph, which is a sensor that registers body movements. However, the actigraph cannot provide information about sleep stages, as the PSG does, or sleep quality (Bourne et al., 2007). In sleep medicine, there has been a rapid change from a strong focus on sleep quantity to a focus on sleep quality (Wade, 2010). The insomnia diagnosis is based on subjective experiences of sleep problems and subjective assessments of sleep have been accepted in quantitative studies of sleep disturbances (Swedish Council on Health Technology Assessment, 2010). The use of subjective measures, such as questionnaires, increases the possibility of assessing sleep in various settings.

Sleep is a multidimensional, biobehavioural phenomenon where each sleep disorder has its specific characteristics. It is of great importance therefore to select a questionnaire that measures the characteristics that are of interest when assessing sleep. If the questionnaire is intended for use in clinical settings, brevity, sensitivity and specificity of the instrument must be considered (Ward, 2011). There are several sleep questionnaires available for use when assessing insomnia symptoms and sleep quality. An interview with the patient, who then describes the nature of the sleep complaints, is an important aspect of the assessment (Lashey & de Menes, 1999) and could complement the questionnaire or scale.

The Insomnia Severity Index (ISI), the Athens Insomnia Scale (AIS) and the Pittsburgh Sleep Quality Index (PSQI), are three frequently used scales when investigating insomnia, consisting of 7-18 items (Bastien et al., 2001; Buysse et al., 1989; Soldatos et al., 2000). The ISI is a seven-item questionnaire containing questions about how sleep disturbances affect the person as well as the nature of the sleep complaint (Bastien et al., 2003). The AIS was constructed to follow the criteria for insomnia as stated in the ICD-10. In total, the instrument comprises eight questions: the first five address sleep complaints and the final three address interference with daytime functioning in daily living (Soldatos et al., 2000). It has been tested in a sample of persons aged 18-79 with primary insomnia, psychiatric inpatients and outpatients and a control group. The AIS was found to be reliable and valid in a variety of settings (Soldatos et al., 2000). The PSQI is the longest of the scales, consisting of 18 items. It covers aspects such as sleep quality, onset latency and efficiency, use of hypnotics and daytime impairments. It has been found to be valid for use in psychiatric and general medical settings and as a screening tool (Buysse et al., 1989). As emphasised by Ward (2011), the selection of scale depends on which characteristic is of interest. The length of a scale could also be of importance, especially in groups of frail persons, where a longer scale might be regarded as tiresome. A possible scale when investigating frail persons is the Minimal Insomnia Symptom Scale (MISS), which consists of three items. The scale has been put forward by the originators as a rough screening tool. An advantage of MISS compared with other scales is its brevity and easy administration (Broman et al., 2008). The MISS has been tested previously in the general population (20-64 years) (Broman et al., 2008) although it has not been evaluated in a sample of elderly persons. Through their role and frequent encounters with patients and residents, nurses are in an excellent position to screen and assess sleep disturbances. In many cases nurses could advise and support a person on sleep promoting strategies. Primary sleep disorders that can be concealed behind insomnia symptoms are sleep-disordered breathing (SDB), restless legs and REM behaviour disorder. Most common is SDB, with a prevalence of 45-60% among persons aged 60 years or older (Ancoli-Israel et al., 2008). If an underlying sleep disorder is suspected or the disturbance is judged to be severe or in need of specialised care, the patient should be referred to a clinic specialised in sleep disorders (Ward, 2011).

Based on the findings of Harvey et al. (2008) and Zilli et al. (2009); sleep quality is problematic to assess using objective measures only. Furthermore, when screening for insomnia, the advantages of using subjective assessments through questionnaires mean that the dimensions pointed out in the Harvey et al. (2008) study can be included (i.e. feeling refreshed and restored by sleep, absence of tiredness and daytime sleepiness) and that administration, availability and interpretation are facilitated (Bourne et al., 2007).

Management of sleep disturbances

The Health Technology Assessment Group defines medical methods as all the methods used in healthcare to promote health, prevent and treat diseases and illnesses and improve rehabilitation and long-term care. In nursing, methods are more commonly referred to as interventions or work procedures (Willman et al., 2003). According to Bulechek and McCloskey, nurses carry out many activities to support the patient. A nursing intervention is defined as *“Any treatment based upon clinical judgement and knowledge that a nurse performs to enhance patient/client outcomes”* (p. 10 Bulechek & McCloskey, 1999). The focus of nursing interventions is the things nurses do to assist the patient in order to achieve a desired outcome. Bulechek and McCloskey continue to classify nursing interventions as direct or indirect care interventions as well as nurse-initiated and physician-initiated interventions. Direct interventions are defined as acts performed through interaction with the patient/client, while an indirect intervention is performed away from the patient. Examples of the former could be to give a massage or engage in social interaction. The latter may be nursing actions aimed at the care environment, such as improving sleep hygiene. Physician-initiated interventions are treatments based on medical diagnoses made by the physician but carried out by nurses (Bulechek & McCloskey, 1999). Such interventions could take the form of administering hypnotics or sedative pharmaceuticals to individuals with sleep disturbances. Yet another classification of nursing interventions is suggested by Willman et al. (2003), incorporating the nurse's working procedure. The actions of the nurse are divided into measurement (the use of instruments to measure symptoms or clinical conditions), prevention (nursing care provided in close contact with the patient and aimed at increasing well-being), support/treatment (education and information to support the person's own ability to handle the situation) and evaluation (evaluation of the effects of the interventions) (Willman et al., 2003).

Pharmacological methods

Pharmacological treatment of sleep disturbances has its advantages, especially for treatment of transient insomnia (Lashey & de Menes, 1999) although there are side effects. Side effects of hypnotic drugs include delirium, slow reaction time and an increased risk of falling. This makes the question of finding non-pharmacological solutions for sleep disturbances especially interesting (Eser et al., 2007). The use of hypnotics for a prolonged period of time may result in rebound insomnia and decreasing benefit (Lashey & de Menes, 1999). Even though sedatives or hypnotics have shown good effect on sleep quality, total sleep time and the number of awakenings during the night, the prevalence of adverse effects also increased in elderly

persons. The greater risk of adverse effects in elderly persons is due to greater sensitivity to peak effects of the drugs, reduced clearance of the sedative or hypnotic drug and the timing and dose of the drug (Bloom et al., 2009). Consequently, caution is needed when treating elderly persons with these kinds of medicines.

Melatonin is a hormone involved in the sleep/wake process. It is produced primarily in the pineal gland and is released from sunset to sunrise (Krystal, 2011). Melatonin is thought to have a sleep-enhancing effect as well as a modifying effect on the circadian rhythm. Oral forms of melatonin have therefore been used in the treatment of phase-advanced sleep disturbances (Krystal, 2011). In a study by Wade et al. (2010) oral melatonin treatment for six months in persons aged 65-80 years, showed a decrease in sleep onset latency and increased morning alertness. The timing of sleep onset was also affected. No withdrawal or rebound effects were observed at the end of the study and few side effects were reported (Wade, 2010). Another interesting treatment is orexin antagonists. Wakefulness depends on a network of cells in the hypothalamus, which activate the thalamus and cerebral cortex. In the hypothalamus there is also a 'switch' that can turn off the arousal system (wakefulness) during sleep. Other neurons in the hypothalamus stabilise the switch function and an absence of orexin results in inappropriate switching between behavioural states, as seen in narcolepsy. It is also hypothesised that a dysfunctional switch function is involved in the pathogenesis of primary insomnia (Riemann et al., 2010).

As described, there are several possible pharmacological treatments for insomnia, although a number carry side effects. Studies of administered melatonin show promising results and it could be suitable for persons with a desynchronised circadian rhythm. Studies of orexin-receptor antagonists are currently in the early stages and further research into the effects are needed. It is argued by Fetveit (2009) and Krishnan and Hawranik (2008) that pharmacological treatment in elderly persons should only be used when a person cannot, or will not, take part in non-pharmacological interventions, if the sleep disturbance is severe or if the assessment is that they will only respond to pharmacological treatment (Fetveit, 2009; Krishnan & Hawranik, 2008). This confirms that elderly persons with sleep disturbances should be recommended non-pharmacological interventions as the first choice of treatment.

Non-pharmacological methods

Self-care for sleep disturbances

Self-care is described by the WHO (1983) as activities undertaken to enhance or restore health, prevent disease and limit illness. The activities may derive from both professional and lay experience. Self-care activities are undertaken by the lay persons themselves or in participatory collaboration with professionals (WHO, 1983). In the

case of sleep disturbances, this could comprise the adoption of new behaviours and the use of sleep hygiene, cognitive therapies or medicines.

In a sample of patients with coronary heart disease (CAD) (Johansson et al., 2007) self-management of sleep disturbances was intended to reverse negative thoughts or to divert the mind through relaxation or activities. In the study by Johansson et al. (2007), however, patients with CAD stated that sometimes this simply repressed the worrying thoughts, which then escalated below the surface. Experiencing rising physical and mental demands leads to loss of ability to continue performing desired activities. This in turn had implications for attempted lifestyle changes. The inability to cope cognitively with the altered situation leads to mental hyperactivity, causing stress, loss of energy and feelings of exhaustion (Johansson et al., 2007). In a study investigating insomnia in the general population in the US, it was found that self-management practices, such as over the counter (OTC) medicines or alcohol, had been used frequently to induce sleep (Ancoli-Israel & Roth, 1999). In summary, self-care is an important part of sleep promotion although it can sometimes be difficult for the individual to manage without professional support, especially when under physical or mental pressure. In some cases, inappropriate strategies, such as the use of alcohol, might even worsen the sleep disturbance. Inquiries into sleep disturbances and self-care strategies must be carried out if the nurse is to be able to support the individual.

Cognitive behavioural therapy

Cognitive behavioural therapy (CBT) has been found to be effective in treating insomnia. The components of such treatments are stimulus control, sleep restriction, relaxation training, cognitive therapy and sleep hygiene education (Bélanger et al., 2012). Among elderly persons (mean age 64.7 years) with insomnia, a comparison between CBT, pharmacological treatment and a combination of both, showed that both CBT and a combination of CBT and pharmacological treatment were effective compared with single pharmacological treatment (Morin et al., 2002). This was contradicted, however, by a study comparing CBT (including sleep hygiene advice, stimulus control, sleep restriction, cognitive therapy and progressive muscle stimulation) with medical treatment in persons ≥ 55 years, which showed no significant differences between treatments (Omvik et al., 2008). It might be important to point out that only persons with dysfunctional beliefs about sleep and chronic insomnia were included in the study by Morin et al. (2002). Persons with progressive somatic illness, a major psychiatric disorder or other sleep disorders were excluded. It is therefore uncertain how well the study sample represents the elderly population and if CBT, or CBT in combination with hypnotics, is only valid treatment for a minority of elderly persons. The study by Omvik et al. (2008) on the other hand, also included persons with somatic conditions, such as hypertension, pain and high cholesterol, which could imply a more trustworthy result. Belanger et al. (2012) advocate implementation of CBT among elderly persons living in the

community, since the treatment is suitable for autonomous persons. However, in hospital settings or residential care, other interventions might be considered more suitable (Bélanger et al., 2012).

Activity as a form of sleep management

Activities have been defined in various ways, such as intellectual, social, recreational and physical (Leung et al., 2011) or as media, individual leisure, collective leisure, social and relaxing activities (Hägglom-Kronlöf & Sonn, 2005). Activities can also be described along the solitary-social axis depending on the context and the sedentary-active axis depending on energy expenditure (Lennartsson & Silverstein, 2001). Furthermore, activities could also include routines. Routines can be described as habits or rhythms, i.e. a regularity of occurrences (Zisberg et al., 2007), and the everyday activities in life, such as having meals, getting dressed, fetching the post, cooking, cleaning or doing the laundry.

Activities based on the physical and cognitive ability and interests of elderly persons should be considered. Suggested activities in RCFs have been indoor gardening, writing letters, playing draughts, laying the table or folding napkins, assisting in preparing meals, sing-alongs, doing woodwork or playing bingo (Lee & Kim, 2008; Miyake et al., 2010; Richards et al., 2005). Nursing implies that patients are seen as individuals with individual needs. Emphasising individualised care demands a certain degree of flexibility (Henderson, 2006). Several studies have shown that sleep disturbances in elderly persons living in RCFs could be lowered by arranging individualised activities (Lee & Kim, 2008; Richards et al., 2005). The main effect of the described interventions was reduced daytime napping (Lee & Kim, 2008; Richards et al., 2005).

In many epidemiological studies, activity is defined in great variation and it cannot be concluded therefore that activities influence a common physiological mechanism, or that activities affecting sleep depend on energy expenditure. Morgan (2003) hypothesised that everyday activities that are emotionally and intellectually satisfying may affect sleep through increased well-being and mood, regardless of the energy expenditure of the activities. The results showed that customary physical activities (e.g. gardening or housework) were significantly related to insomnia whilst social engagement and daily walking were not (Morgan, 2003). The associations between physical and/or social activities and sleep have been investigated in several studies and subgroups of elderly persons. The findings are inconclusive with regard to the establishment of statistically significant improvements in sleep although all studies show improvements.

In conclusion, nursing interventions could be used to reduce the consumption of sleep medication among the elderly. To facilitate sleep, increased well-being and a feeling of having experienced a meaningful day are important (Henderson, 1970). Non-pharmacological interventions presented take the form of modifications of the

patients' environment. This includes sleep hygiene and educational and behavioural approaches to sleep enhancement (Lashey & de Menes, 1999). CBT is commonly promoted as self-help or self-efficacy treatment for insomnia but the treatment might not be suitable for all elderly persons. The effects of physical and social activities on sleep are promising. Treating insomnia through regular activity could be a solution but since activity is a broad concept, the link between activity and insomnia needs to be investigated further.

Scientific outline for the thesis

According to Parse (1987), there are two co-existing paradigms within nursing: the totality paradigm and the simultaneity paradigm, neither of which is superior to the other. Fawcett (2005) on the other hand, describes the paradigms within nursing as three different world views: the reaction view, the reciprocal view and the simultaneous action view. The reaction world view is the most objective and quantitative although humans are described as bio-psychosocial-spiritual beings, as in the totality paradigm. Only objective measures can be investigated according to the reaction view. The second world view described by Fawcett (2005) is reciprocal, in which the human is perceived as holistic, although the parts can be investigated. However, the human is more than the sum of the parts. Furthermore, the human interacts with the environment and although changes in states cannot be predicted (as in the reaction view) changes can be estimated. Research can be both qualitative and quantitative since reality is perceived as multidimensional, context-dependent and relative.

The studies included in this thesis correspond to the totality paradigm, as described by Parse (1987). The totality paradigm views the human as a bio-psychosocial-spiritual being that can be understood through the parts although it is more than the sum of the parts. The person is separated from the changing environment but interacts continuously with it. The environment can be modified to retain or achieve a balance and the goal of nursing is thought to be health promotion (Barrett, 2002; Parse, 1987). Consequently, it is of interest to study the care environment and how it affects human sleep. Adopting the totality paradigm allows for the use of qualitative and quantitative methods as well as evidence-based practice (Barrett, 2002). As noted previously, the totality paradigm resembles in many ways the reciprocal world view described by Fawcett (2005) but also the reaction world view in terms of the view of human beings. Research within the totality paradigm can be described as being consistent with the nursing process and target-oriented in character. The goal of the nursing provided is health promotion. It can be said to be nursing interventions in its most tangible form.

Rationale

Sleep is a multidimensional, biobehavioural phenomenon, which can be affected by psychological, social, environmental and biological factors. Accepting the view of the totality paradigm, where the human is seen as a bio-psychosocial-spiritual being, thus seems reasonable in relation to the phenomenon of interest.

Investigating insomnia in the elderly, and further on in various healthcare settings, involves taking into account several influencing factors. The aims of the studies included in this thesis were developed gradually depending on the results of the previous studies (Figure 2). Firstly, interventions carried out to promote sleep were evaluated. A systematic review was performed, evaluating the effects and the existing evidence of documented, empirically tested nursing interventions for sleep promotion.

The review came to raise questions about the diversity of the instruments used and what kind of instrument would be appropriate to use for elderly persons to recognise sleep disturbances such as insomnia. These thoughts led to the testing of a sleep scale, which had not been tested previously in elderly persons.

If insomnia is identified or the risk of developing insomnia increases, the nurse should prevent/treat the condition. The interventions evaluated in the review were all induced and controlled by nurses. However, in the light of patient participation and emancipation, other interventions that focus on the individuals' potential to perform sleep promotion on their own is of interest. To investigate this aspect further, there was a focus on activities. Firstly, the relationship between leisure activities and sleep disturbances among the elderly was investigated. The question was then problematised further with an exploration of everyday activities in an RCF environment and the way in which sleep and activity are perceived to interact.

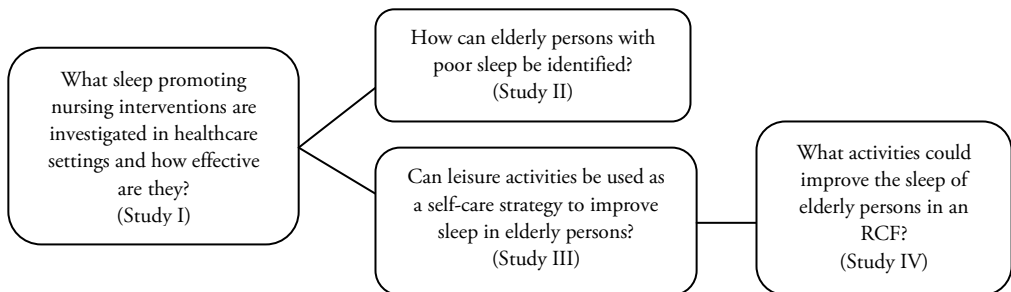


Figure 2. The research questions that led to the studies included in the thesis.

Aims

The overall aim was to test a tool for assessing insomnia symptoms in elderly persons and to investigate late-life insomnia in terms of associated factors and evidence of non-pharmacological interventions in healthcare settings.

The aims of the individual studies (I-IV) in the thesis were:

- To describe and evaluate the effectiveness of sleep promoting nursing interventions for patients in healthcare settings.
- To test the measurement properties of the Minimal Insomnia Symptom Scale among persons aged 65+ in Sweden.
- To investigate associations between sleep disturbances and leisure activities in men and women ≥ 60 years in a Swedish population.
- To explore sleep habits and everyday activities at residential care facilities in Sweden. A further aim was to investigate the link between sleep habits and everyday activities.

Methods

Design

The study designs used in this thesis are cross-sectional (Studies II- III), systematic review (Study I) and explorative (Study IV). An overview of the studies and their designs is shown in Table 1. Investigatory research questions are needed within nursing, covering both theoretical and methodological pluralism and derived from quantitative and qualitative traditions. The use of diverse methods is of help when studying a variety of nursing phenomena or when studying a single phenomenon, such as insomnia, from different perspectives (Geanellos, 1997). Within the totality paradigm, both quantitative and qualitative research is accepted although it is not certain whether all qualitative approaches fit into the paradigm. Nursing science relies on multiple sources of knowledge and has its origin in several paradigms. The strict methodological rigour can be perceived as deterministic and reductive (Nairn, 2012), which is why an open mind to a pluralistic view of methodology might be more appropriate. It was therefore suitable to investigate both the quantitative and qualitative aspects of insomnia in elderly persons.

Table 1. Overview of the studies included in the thesis.

Study	1	2	3	4
Design	Systematic review	Quantitative, cross-sectional	Quantitative, cross-sectional	Qualitative, observational
Sample	n = 9 RCTs, n = 645 in-patients ≥19 years	n = 548 Persons ≥65 years	n = 945 Persons ≥60 years	Persons living in residential care facilities
Data collection	Database search Manual search	Questionnaire	Questionnaire	Observations (n = 39) and interviews (n = 10)
Data analysis	GRADE	ROC curve , sensitivity, specificity, reliability, inter-item correlations and floor/ceiling effects	Chi-squared test Mann-Whitney U-test Spearman's rho Multiple logistic regression: backward LR	Content analysis

ROC curve = Receiver operation characteristic curve.

Samples and context

Study I was a review of scientific research articles found through database searches and manual searches in reference lists. The inclusion and exclusion criteria are described in Table 2.

Table 2. Inclusion and exclusion criteria for Study I.

	Inclusion	Exclusion
Population	Adults (≥ 19 years)	Children, adolescents (< 19 years) Healthcare staff Shift workers
Intervention	Non-pharmacological	Pharmacological Herbal remedies, (OTC ¹)
Context	Healthcare settings	Out-patient care
Outcome	Sleep measures, such as total sleep time, sleep efficiency, mid-night awakenings, sleep onset latency, sleep quality	Lack of sleep measures
Study design	Experimental studies Systematic reviews/Meta-analysis	Non-experimental studies Narrative reviews
Language	English, Scandinavian ²	Non-English
Abstract	Available	No abstract

¹Over the counter remedies

²Publications in Swedish, Danish or Norwegian were accepted but were not found.

Studies II and III were cross-sectional studies where the samples were drawn from The Swedish National Study on Ageing and Care – Blekinge (SNAC-B), which is part of a larger, longitudinal multi-centre study (Lagergren et al., 2004). The participants in SNAC-B are elderly persons (≥ 60 years) living in the municipality of Karlskrona in South East Sweden. At baseline (2001-2003), 1,402 persons were enrolled. The sample consisted of ten age cohorts, with a randomised selection of the younger age cohorts (60, 66, 72 and 78 years of age) and total inclusion of the older age cohorts (81, 84, 87, 90, 93 and 96 years of age). A follow-up survey is carried out for each age cohort each time they reached the age of an older cohort. Every six years, a new cohort of 60-year-olds is enrolled (Lagergren et al., 2004). In Study II, which was undertaken in 2008, 978 persons were enrolled at baseline, all of whom were still participating in SNAC-B. Of these, 886 persons were available for participation in Study II. The 886 persons were contacted by letter and 548 returned the questionnaire, yielding a response rate of 61.9%. The original ten age cohorts of the SNAC-B study were amalgamated into three clusters: 65-74 years (including the 67- and 73-year-olds), 75-89 years (including the 79-, 85- and 88-year-olds) and 90+ (including those aged 91 years or older). The sample in Study III consisted of persons (n = 945) enrolled in the SNAC-B study in the survey (wave 2), which was carried

out in 2007-2009. The original ten age cohorts of SNAC-B were reduced to three clusters: 60 and 66 years (retiring age), 72 and 78 years (old adults), 81, 84, 87, 90, 93 and 96+ years (old, old adults), in order to include a larger number of persons in each cluster.

The final study (IV) was preceded by a pilot study. The aim of the pilot study was to specify research questions about elderly people's sleep habits and what factors affected their sleep at the residential care facility. The study was intended to provide a foundation for Study IV. In the pilot study, a single general unit at an RCF was studied. Both the physical environment and the psychosocial environment created by the persons who lived or worked at the facility were of interest. Both the persons living at the unit and the staff were observed in the pilot. In Study IV focus was put solely on the residents.

Study IV described the daily lives of residents living at three different RCFs during autumn and winter 2011/2012. Purposeful sampling was carried out for the interviews. The criteria for participation were that the person should be living at the unit, be physically and mentally stable and have the cognitive ability to answer questions. Twelve residents were asked to participate and two declined. The reasons for declining were lack of interest and perceived poor health. There was convenience sampling of RCFs, the only inclusion criterion being that the wards included should be general geriatric units. The RCFs were at three different locations in a municipality with a population of approximately 31,200. Two of the facilities were located in small communities with populations of approximately 2,000 – 3,700. The third care facility was located in a small town with a population of 19,000. The number of residents varied from 7-16 per unit. The staff consisted of auxiliary nurses and nursing assistants with a high school education and with/without formal training, who provided 24-hour care. The number of staff varied throughout the day. A registered nurse was available and was responsible for all the units at the facility during the daytime and was on call during the evening, at night and at weekends. There was a manager for each facility who worked office hours. Occupational therapists and physiotherapists were linked to the units, although they were not present on a daily basis.

Each RCF consisted of 2-3 units. Inside each unit the residents had their own apartment and there were corridors connecting the apartments with the day rooms at the centre. Day rooms usually consisted of a dining room where the residents had their meals together, and a room with sofas and armchairs in front of a television.

Data collection

The second study (II) commenced in December 2008, when questionnaires were posted. Contact details were acquired from the SNAC-B. Six weeks later, a reminder was sent to those who had not returned the questionnaire. The questionnaire contained 25 questions related to sleep together with questions about age and gender and whether the person had been able to fill in the questionnaire independently or needed help. Data for Study III was extracted from SNAC-B. The collection of data in SNAC-B is done by means of structured interviews, medical examinations and supplementary questionnaires (Lagergren et al., 2004). Demographic data as well as data on sleep, leisure activities, functional status, mood, general health and cognition were extracted from the SNAC-B self-reported questionnaire. Study IV had a qualitative approach. Data was thus collected through triangulation of observations and interviews.

Literature search

For the systematic review (Study I), a literature search was carried out in June 2009 in the following databases: Academic Search Elite, CINAHL, the Cochrane Library and MedLine/PubMed. The search strategy was inspired by the approach described by Droogan and Cullum (1998). Searches were made by combining indexed terms from the thesauruses of the databases and free text. Search terms were combined into search blocks using the Boolean operator 'OR'. The blocks were then combined using the Boolean operator 'AND'. The search terms used were sleep, music therapy, relaxation therapy, complementary therapies, sleep promotion, sleep management, intervention and experimental studies.

References were identified and duplicates were excluded. Studies lacking an abstract were rejected. The primary search yielded 35 articles of interest, of which seven were reviews or meta-analyses. A manual search revealed a further 17 articles. The steps in the literature search process are shown in Figure 3.

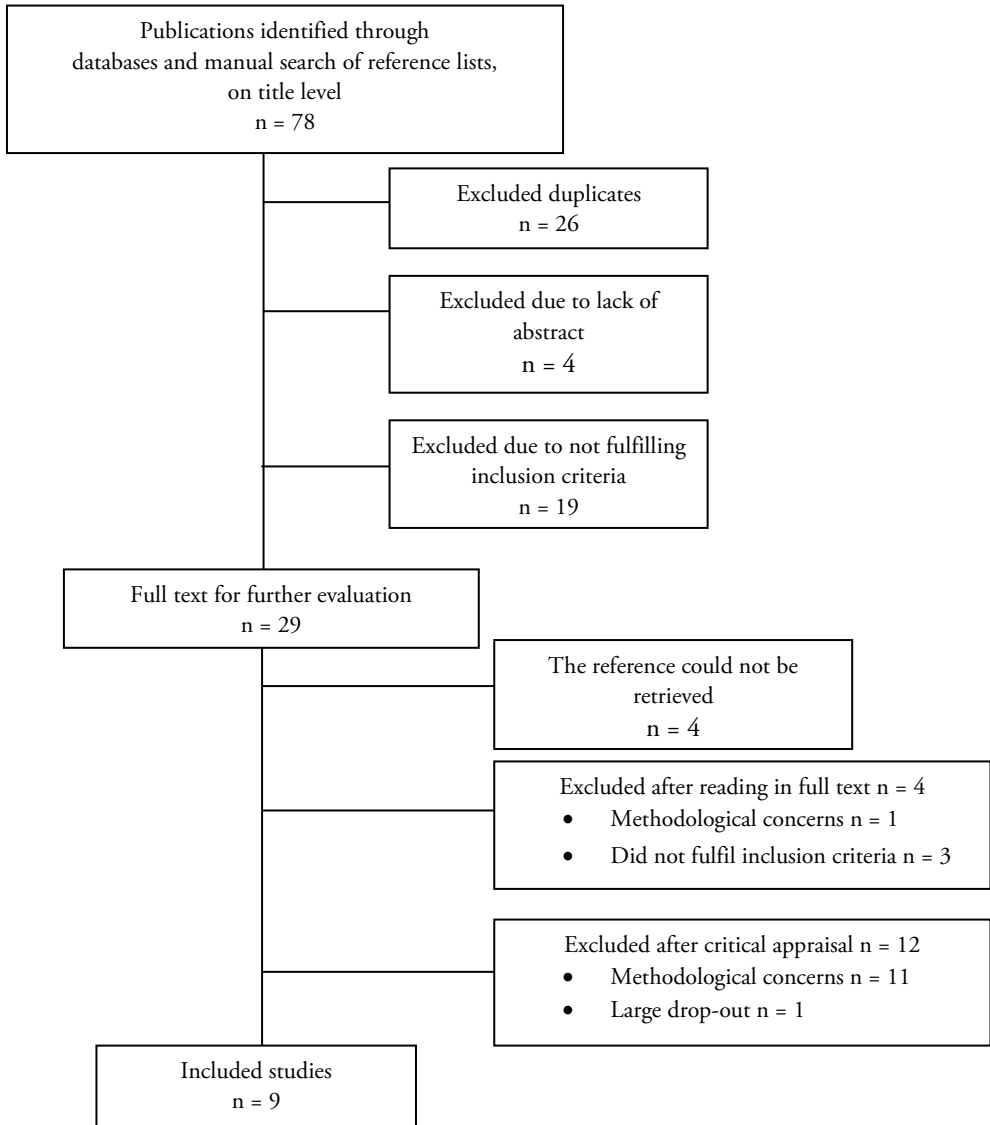


Figure 3. Flow chart of the search procedure for Study I.

Observations

Thirty-nine observations, each lasting 1½-2 hours and taking place at different points during the daytime, were performed over a six-month period. Observations were chosen for data collection, since they facilitate understanding of everyday life with its complex social situations (Bolster & Manias, 2010). One researcher carried out all observations. Field notes were made during the observations following a predefined protocol. The protocol for the observations had two main points: interaction/communication (how, about what, with whom, where, emotional state) and activities/what is going on (what happens, who does something/participates, on whose initiative, how does it happen, where does it happen, for how long does it happen). The protocol was developed by the researchers specifically for this study.

Interviews

The interviews were carried out after the observation period at each facility. The purpose of the interviews was to clarify activities and behaviours that had been observed previously and to provide an understanding of sleep habits and perceptions about sleep and activities (Bolster & Manias, 2010). The researcher who performed the observations also performed the interviews. A semi-structured protocol was used for the interviews. The protocol could be compared to having a manuscript that more or less structures the interview (Kvale & Brinkmann, 2009). In this case, a set of predefined questions concerning sleep and activities was used.

Measures

Critical Appraisal Skills Programme (CASP)

The critical appraisal of the selected studies (Study I) was carried out by using templates from CASP. The templates were downloaded and are free to use. Different templates are available depending on the research design of the study under scrutiny. Each template is made up of ten to eleven questions concerning ethical considerations, study size, missing data, relevance and generalisability of the findings (Public health resource unit, 1993). There is no scoring system and instead the questions are intended to draw the reviewer's attention to issues of importance to the reliability and validity of the study. All studies selected for critical appraisal (21) were reviewed by two of the researchers independently and were classified as high, medium or low quality. If the reviewing researchers differed in their classification of a study,

the reference was discussed until consensus was achieved. Twelve studies were excluded after critical appraisal (Table 3) and nine was included in the systematic review (Table 4).

Table 3. Overview of publications excluded after critical appraisal in Study I.

Author/Year	Title	Design	Intervention	Reason for exclusion
Ancoli-Israel et al. 2002	Effect of light treatment on sleep and circadian rhythms in demented nursing home patients.	RCT	Bright light therapy	Methodological concerns
Cmiel et al. 2004	Noise control: A nursing team's approach to sleep promotion.	Quasi-experimental	Sleep hygiene	Methodological concerns
Ho et al. 2002	Non-pharmacological sleep promotion: Bright light exposure.	Quasi-experimental	Bright light therapy	Methodological concerns
Koyama et al. 1999	Bright light treatment for sleep-wake disturbances in aged individuals with dementia.	Observational study	Bright light therapy	Methodological concerns
McDowell et al. 1998	A non-pharmacological sleep protocol for hospitalized older patients.	Prospective cohort study	Selection of interventions	Methodological concerns
Ouslander et al. 2006	A non-pharmacological intervention to improve sleep in nursing home patients: Results of a controlled clinical trial.	RCT	Sleep hygiene	Methodological concerns
Richards et al. 2003	Use of complementary and alternative therapies to promote sleep in critically ill patients.	Systematic review	Selection of interventions	Methodological concerns
Robinson et al. 2005	The shh-h-h project: Non-pharmacological intervention.	Quasi-experimental	Selection of interventions	Methodological concerns
Schnelle et al. 1999	The nursing home at night: Effects of an intervention on noise, light and sleep.	RCT	Sleep hygiene	Methodological concerns
Semiet et al. 2004	Sleep management training for cancer patients with insomnia.	Quasi-experimental	Relaxation	Methodological concerns
Smith et al. 2002	Outcomes of therapeutic massage for hospitalized cancer patients.	Quasi-experimental	Massage	Large drop-out
Walder et al. 2000	Effects of guidelines implementation in a surgical intensive care unit to control nighttime light and noise levels.	Observational study	Sleep hygiene	Methodological concerns

Table 4. Description of studies included in Study 1.

Study	Study sample/Setting	Intervention	Control condition
Alessi et al. 2005 USA	n = 118 (91 women) Drop-out: 10 Mean age: 87.8 IG, 85.9 CG Setting: Nursing homes	Sleep hygienic protocol for 5 days.	Care as usual n = 56
Kim et al. 2004 Korea	n = 30 (13 women) Drop-out:2 Mean age: 65,1 IG, 68,3 CG. Setting: Stroke Centre (Rehab)	Intradermal acupuncture 2 days. n = 15	Sham acupuncture n = 15
LaReau et al. 2008 USA	n = 59 (34 women) Drop-out:11 Mean age:79,6 years, (range 65-94) Setting: Adult medical unit & cardiology unit.	Sleep hygiene protocol for 16 weeks. n = 29	Care as usual n = 30
Richards 1998 USA	n = 71 (all men) Drop-out:2 Mean age: N/A, (range 55-79) Setting: Intensive care unit (Veterans hospital)	Group 1: back massage 6 min before going to bed n = 24, group 2: 7,5 min tape with muscle relaxation, mental imagery and background music at bedtime n = 28	Care as usual and short rest. n = 17
Richardson 2003 USA	n = 36 Drop-out: No drop out Mean age: 58,4 years (range 22-78) Setting: Intensive care ward.	Relaxation and mental imagery delivered in-person. The intervention lasted 2 days.	Care as usual. n = 20
Soden et al. 2004 UK	n =42 Persons with advanced cancer Drop-out:6 Mean age: 73 years Setting.Hospice.	Randomization to aromatherapy/massage or massage only. The intervention lasted 4 weeks.	No massage. n = 13
Suen et al. 2002 Hong Kong, China	n = 120(110 women) Drop-out:19 Mean age: 81.7 Setting: Hostels for elderly.	Experimental group, n = 52, used magnetic pearls. The intervention lasted for 3 weeks.	Control group 1 used Junci Medulla. Control group 2 used Semen Vaccariae.
Williamson 1992 USA	n = 60 (CABG patients) Drop-out:4 Mean age:58 years (range 35-69) Setting: Post-intensive care unit.	Effect of common nature sounds on sleep. A tape was played through the night, 3 nights in a row.	Care as usual. n = 30
Zimmerman et al. 1996 USA	n = 96 (CABG patients) No drop-out Mean age: 67 years Setting: Post-intensive care unit.	Soothing music (group 1) instrumental music video (group 2). The intervention lasted 2 days.	Resting. n =32

IG = intervention group CG = control group N/A = not available.

Uppsala Sleep Inventory 25

In Study II, the Uppsala Sleep Inventory 25 (USI-25) was used. This is a questionnaire that was developed in the early 1980s. It is based on self-reports and contains items related to sleep disturbances and habits, such as timing and duration of sleep, tension or disturbing thoughts when trying to sleep, physical symptoms during the night, daytime behaviour and consumption of sleep medication. USI-25 has been used in several studies previously although only in a Swedish context (Broman et al., 2008; Edéll-Gustafsson et al., 2003; Edéll-Gustafsson & Hetta, 1999; Mallon et al., 2000, 2002; Mallon & Hetta, 1997; Yngman-Uhlin & Edéll-Gustafsson, 2006). USI-25 also includes three specific items that capture the cardinal symptoms of insomnia. These items can be used separately, in which case they are called the Minimal Insomnia Symptom Scale (MISS), which is described further below.

Minimal Insomnia Symptom Scale

In Study II, three questions from USI-25, forming a screening tool, were extracted and evaluated. The scale, called Minimal Insomnia Symptom scale (MISS), was developed in Sweden and includes items from three major features of insomnia. These are difficulty initiating sleep, difficulty maintaining sleep and not feeling refreshed by sleep (Broman et al., 2008). Each item has five response alternatives, ranging from no problems to very severe problems. A total score is calculated on the scale 0-12, where a higher score indicates more difficulty. The duration of the perceived sleep problems and the frequency of the problems are not addressed by the scale. Cronbach's alpha of the MISS was 0.811, indicating internal consistency in the scale.

Sleep disturbances

Sleep disturbances (Study III) were measured by means of eight questions developed for the Comprehensive Assessment and Referral Evaluation interview schedule (Teresi et al., 1984) and were previously applied in a three year follow-up study of elderly persons (Livingstone et al., 1993). The questions are dichotomous (yes/no) and based on self-reports. Examples of questions are *Is your sleep interrupted during the night?*, *Are you having difficulty falling asleep?* and *Are you waking up early?*. These questions embody common complaints of insomnia. In Study III, a cut-off value at the third quartile of the total sample was considered to be the demarcation between those experiencing good or poor sleep. A positive answer in ≥ 4 of the questions equalled poor sleep, while 0-3 reported sleep disturbances was considered to be good sleep. The questions were developed in order to examine prevalence of sleep disorders and associations between sleep disorders and dementia, disability and depression (Livingstone et al., 1993). Sleep disorders were viewed by the constructors as being secondary to affective disorders although the relationship between sleep disorders preceding a future depression was also investigated. For descriptive analyses, questions

about use of sleep medication and nighttime sleep (hours) were added. In the study by Livingston et al. (1993), two or more reported sleep difficulties indicated a sleep disorder, adapting to a more liberal demarcation between good and poor sleep than was proposed in Study III. This is also seen in the prevalence of sleep disturbance found at the two measurement points, 33.3 – 43.1% (Livingstone et al., 1993).

Leisure activities

All variables from the sector *Leisure, engagement and recreation*, except for the variable *competing in sports* were extracted from the SNAC-B questionnaire for use in Study III. Examples of the leisure activities are playing computer games/using the internet, hunting or fishing, reading books or playing an instrument. In total, eighteen variables were extracted, although two questions concerning light and intensive physical activity were amalgamated into one variable and dichotomised, describing whether or not the person performed regular exercise. Exercise is defined by the WHO as a subcategory of physical activity that is planned, structured and repetitive and the purpose of which should be to improve or maintain components of physical fitness (WHO, 2013b). The new variable comprised activities such as jogging, walking, cycling, gardening, exercising, swimming, skiing, skating and ball games. The highest frequency was registered, irrespective of intensity. All persons who took part in physical activities at least once a week were considered to exercise. All variables were dichotomous.

Previous research contains diverse labelling and categorisation of leisure activities (Lennartsson & Silverstein, 2001; Leung et al., 2011; Menec, 2003). In Study III, the leisure activities were clustered into physical outdoor activities, socio/intellectual activities, creative activities and cultural activities depending on the main component/purpose of the activity.

Functional status

Functional status in Study III was measured using the Instrumental Activities of Daily Living (IADL) items: shopping, cooking, cleaning, washing and transportation. Each item had the following response alternatives: dependent, partly dependent or independent. Those persons who were dependent and partly dependent were classified as dependent, thus creating five dichotomous items of IADL. The five items were then amalgamated into a dichotomous variable (dependent on one or more activity/independent).

Mood

A subscale of the Life Satisfaction Index was used to measure mood (Study III). In a factor analysis by Liang (1984), three factors were found: mood, zest and congruence, which have been validated in a sample of elderly persons (Fagerström et al., 2012). The mood factor comprises three items: *I am just as happy as when I was younger*, *My life could be happier than it is now* and *These are the best years of my life*. All questions

are answered with agree, uncertain or disagree. The item *My life could be happier than it is now* was reversed before the total score was computed. The response alternatives 'uncertain' and 'disagree' were amalgamated for items 1 and 3, and 'agree' and 'uncertain' were amalgamated for *My life could be happier than it is now*. Mood scores are shown as being above or below the median value.

General health

In Study III, general health was measured using an item from the Short Form 12 questionnaire (SF12) with five response alternatives, ranging from poor to excellent (Ware et al., 1996). The original five responses were then transformed into three responses: poor/fair health, good health and very good/excellent health.

Mini Mental State Examination

Mini Mental State Examination (MMSE) attempts to measure various cognitive processes, which is why the scale was created with the intended heterogeneity. It can be used as a screening device for cognitive impairment and three levels of cognition are defined. The score ranges from 0 to 30, where 0-17 points indicates severe cognitive impairment, 18-23 equals mild cognitive impairment and 24-30 no cognitive impairment (Tombaugh & McIntyre, 1992). In Study III, a cut off at ≥ 24 of the MMSE was made, separating those with cognitive impairment, regardless of severity, from those without cognitive impairment.

Analysis

Evidence strength

Study I included nine studies that passed the appraisal and were assessed as medium to high scientific quality. Studies with low scientific quality ($n = 12$) were excluded because of their more extensive methodological limitations, such as lack of sleep measures, unclear group allocation or large drop-out. A compilation of the findings and a grading of the evidence of the interventions were then carried out using the GRADE system. The GRADE system can be used when compiling and assessing evidence of a certain treatment or intervention. It consists of a four-grade scale that facilitates the evaluation of evidence and the strength of recommendation. Four key elements are highlighted: study design, study quality, consistency and directness. The design of the study affects the evidence, where randomised controlled trials (RCT) generate the highest-quality evidence (BMJ Group, 2004). Randomised controlled trials are preferred when evaluating the effect of an intervention, due to the rigorous design with a strong focus on internal validity (Taylor & Muncer, 2000). It should be noted, however, that not all aspects of nursing practice can be investigated through

RCTs, which is why other methods also need to be considered for gathering evidence (Taylor & Muncer, 2000). In their note, Polit and Beck (2008) suggested a hierarchy of evidence, topped by systematic reviews of RCTs and non-randomised trials. These are followed by RCTs and non-randomised single studies (Polit & Beck, 2008). According to the British Medical Journal (BMJ) Group, the instigators of the GRADE system, the next key element is the quality of the study. In the systematic review (Study I), CASP templates for RCTs were used when judging the quality of the studies. Consistency refers to similarity of the effects across studies investigating the same intervention/treatment. Attention should be paid to unexplained inconsistency and difference in the direction of the effect. Lastly, the directness should be considered. Directness is the extent to which the study sample, the interventions/treatments and the outcome measures are similar to those in focus, i.e. if the findings of a study are transferable to your group of patients (BMJ Group, 2004). For Study I, a minor modification of the GRADE system was made. The possibility of increasing the grade if there is evidence of a dose response gradient was found irrelevant when evaluating the effects of nursing interventions and was omitted. Reliability increases if the results of several studies point in the same direction. However, it is important that the inclusion criteria for the individual studies are clear and that the study samples are comparable. Furthermore, the intervention and outcome measures should also be comparable between the studies. If this is accomplished, a meta-analysis of the studies can be performed (Polit & Beck, 2008).

Cohen's *d* was used in order to estimate the effects of the interventions. However, due to the heterogeneity of the studies, effects were calculated for each study. Cohen's *d* is calculated by subtracting one mean value from the other and then dividing the difference by the standard deviation (SD) of the control group or a pooled standard deviation (Taylor & Muncer, 2000). A pooled standard deviation is the average variation of subgroups. However, if the SD of the two groups differs, the homogeneity of variance assumption is violated. In such a case, pooling of the standard deviation should be avoided. Instead, the SD of the control group is inserted as the denominator in the equation. The SD of the control group is not contaminated by the treatment and will reflect the standard deviation of the population from which the sample was drawn. The larger the control group, the more likely it is to resemble the population (Ellis, 2009). An effect of 0.2 is considered small, an effect of 0.5 is considered to be of moderate importance and an effect of 0.8 is considered to be of clinical importance (Norman & Streiner, 2008).

Statistical analysis

Analyses in Study II were conducted using PASW Statistics 17.0 (SPSS Inc. Chicago, IL.). To investigate the measurement properties, assumptions concerning adding up item scores into a total score were tested. All items on a scale should be correlated

positively with the construct. This was considered to be supported if corrected item-total correlations were ≥ 0.4 (Ware & Gandek, 1998). Continuing this line of argument, all items must be correlated with each other, rendering a high degree of internal consistency of scale as measured by coefficient alpha (Streiner, 2003a; Streiner & Norman, 2008). When comparing groups for research purposes, an alpha of 0.7 – 0.8 is regarded as satisfactory. However, when conducting clinical investigations, a value of 0.9 – 0.95 is desirable (Bland & Altman, 1997). Floor and ceiling effects on the scale (i.e. the proportion of persons with minimum and maximum scores respectively) were also investigated. Floor and ceiling effects should not exceed 15% (McHorney & Tarlov, 1995).

The discriminating ability of the MISS, i.e. the scale's ability to distinguish good sleepers from poor sleepers, was examined. A receiver operating characteristic (ROC) curve was drawn and the area under the ROC curve (AUROC) was calculated. The ROC curve is an illustration of the discriminating abilities of a test at different cut-off values (Goutham, 2003). Based on the ROC curve, sensitivity and specificity can be calculated for various cut-off scores. Sensitivity is the ability to diagnose a condition correctly, while specificity measures the ability to accurately identify non-cases. These values provide an indication of the discriminatory abilities of the scale (Bring & Taube, 2006). In Study II, sensitivity and specificity were considered equally important. Youden's index was therefore used to decide an appropriate cut-off value:

$$((\text{sensitivity} + \text{specificity}) - 1)$$

Since the maximum value of Youden's index is 1, indicating a perfect test, the cut-off value associated with the highest Youden's index (J) is considered optimal (Bewick et al., 2004). Results were reported as frequencies, percentages and confidence intervals. P-values < 0.05 were considered statistically significant.

For comparison of the prevalence of insomnia symptoms found using MISS, a proxy gold standard was constructed. This proxy consisted of three items extracted from USI-25: experiencing severe or very severe difficulties with daytime sleepiness, physical tiredness after sleep and admitting to having sleep difficulties (yes/no). The items capture possible daytime symptoms of insomnia and the diagnosis of insomnia implies a presence of both nocturnal and daytime symptoms (Lichstein et al., 2011). Furthermore, a drop-out analysis was performed on non-respondents using available data from the SNAC-B study concerning age, gender and reported diseases.

The data in Study III were analysed using PASW Statistics 21.0 (SPSS Inc. Chicago, IL., USA). Descriptive analyses and group comparisons were made using the Chi-squared test and the Mann-Whitney U-test. Yates' continuity correction was used in four field tables (Altman, 1999). Associations between variables were calculated by means of Spearman's rho and multiple logistic regressions. Age, gender, general health, functional status, mood and cognitive function were considered to be possible

confounding variables. Correlations between sleep disturbances, confounding variables and leisure activities were investigated using Spearman's rho. All correlations between variables entered into the multiple regression models were checked for multicollinearity using Variance Inflation Factor (VIF). A VIF higher than 10 indicates multicollinearity (Norman & Streiner, 2008). Only variables found to be significant ($p < 0.05$) through cross-tabulation and associated with sleep disturbances in the Spearman's rho were entered into the multiple logistic regressions. Ten of 17 variables concerning leisure activities correlated significantly with sleep disturbances. The multiple logistic regressions were all performed using backward LR. The logistic regression analyses are presented as odds ratios (ORs) with 95% confidence intervals (CIs). Goodness-of-fit of the regression models was performed using the Hosmer and Lemeshow test (Bewick et al., 2005). Response alternatives considered to have the lowest association with ≥ 4 sleep disturbances were chosen as references for each variable. Subjects with an internal drop-out in one or several variables were excluded from the models.

Investigating associations between leisure activities and sleep disturbances could be perceived as being very straightforward. However, no relationships are that simple and there is reason to believe that other variables apart from leisure activities could influence the occurrence of sleep disturbances. These variables are called confounders and can be described as variables that blur or distort the real effect of an exposure. There are three criteria that must be fulfilled for a variable if it is to be considered a confounder: the variable should be associated with the outcome, it should also be associated with the exposure and it should not be the causal pathway between exposure and outcome (Jager et al., 2008).

Confounding variables can be checked for through the study design by means of randomisation, restriction or matching. If this is not possible, stratification or multivariate analysis are other ways to adjust for confounders (Jager et al., 2008). In Study III, the models were adjusted for gender, age, functional status, mood and general health, since these were considered to confound the associations between sleep disturbances and leisure activities.

Qualitative content analysis

Analysis in Study IV took the form of content analysis. Data comprised field notes and interview transcripts. Qualitative content analysis is a descriptive method without a basis in any specific tradition. The course of the analysis is to break down data into smaller units, coding and naming units according to what they represent (Polit & Beck, 2008). The analysis started by reading the field notes as a whole text. Notes on the content were made in the margins. In the next step, the text was read again and text themes were identified and marked in the text (Burnard, 1991). Open coding of

the transcripts, describing the content, was then carried out. The coding system captured specific features of the text and revealed differences and similarities (Downe-Wamboldt, 1992). The main activity was emphasised when labelling the text. The entire content was coded unless the respondent went off track (Burnard et al., 2008). Similar codes were combined into broader categories. Categories are the descriptive names for groups of data (Morse & Field, 1996). In Study IV, the categories represented patterns of behaviour.

Three of the researchers independently created lists of categories that were compared and discussed. Based on the three lists and the discussion, the first author created a list of categories, reducing the initial number of categories. All the researchers subsequently discussed the final list and the labelling of the categories. After the categories had been agreed on, the field notes were sorted into codes and sub-categories and grouped under the labelled categories (Burnard, 1991). Finally, the transcripts of the interviews were read and coded. Data from the interviews formed subcategories that enriched the categories previously found when sorting the observational data. When no new codes emerged, the categories were considered to be full and a descriptive paragraph was written for each category (Morse & Field, 1996). The analysis was a combination of describing the manifest content of the data, i.e. physically present data, and the latent content. The latter can be described as the deeper structure conveyed in the observations and interviews (Berg, 2009). The four researchers performing the analysis had previous experience as registered nurses in hospital care and/or care of the elderly.

Ethical considerations

Research ethics originate from the reactions to research on humans that was dangerous or harmful. The first official code for medical research was formulated in conjunction with the Nuremberg trials in 1947 (Vetenskapsrådet, 2013). The primary interest in medical research involving humans is their well-being. This has priority over all other interests. The purpose of medical research is to reach an understanding of the causes, development and effects of diseases. The purpose is also to improve diagnostic, preventive and therapeutic interventions. Interventions must be evaluated with regard to their effectiveness, safety, efficiency, accessibility and quality. Protection of human health and rights is central when conducting medical research. The design and performance of medical research should be described in a protocol, which is submitted to a research ethics committee for consideration, guidance and approval (World Medical Association [WMA], 2008). The studies in this thesis have been granted ethical approval by the regional Ethical Review Board in Lund; Study II (LU 605-00, LU 744-00, 178/2008), Study III (LU 604-00), Study

IV (Ref no. 308/2011). Furthermore, the privacy of research subjects must be protected as well as the confidentiality of their personal information in order to minimise the impact of the research on their social, mental and physical integrity (WMA, 2008). In Studies I, II and III, the participants were protected through the reporting of mean values and comparisons at group level. In Study IV, which had a qualitative design, statements by participants were cited to ensure transparency of methodological aspects. The personal integrity of the participants could thus be at risk (Kvale & Brinkmann, 2009). The use of citations in Study IV was done with care in order to preserve confidentiality yet still comply with the scientific norms for reporting research in a transparent way. Confidentiality and respect for the participants' autonomy was further honoured by securing their informed consent (Beauchamp & Childress, 2009). For Studies II, III and IV, informed consent was obtained. In Study IV, written consent was obtained from the manager of each facility, the head of the department of geriatric care in the municipality and the residents who were interviewed. Verbal and written information about the study was given to the staff at a staff meeting and to residents during the initial contact. No written consent from the residents was obtained for observations. It was considered difficult to obtain consent from everyone who might enter the field, since the observations were carried out in the public areas of the RCF. Another difficulty, which has been pointed out previously (Mulhall, 2003), is that even though information was provided verbally and in writing, it could be difficult to tell if the staff and residents were fully aware of the purpose of the observations and the role of the observer performing the observations. To handle this, the observer always wore a badge with her name and the word 'Researcher'. Furthermore, residents were reminded occasionally about the study and new staff and visitors were approached. It has been suggested that a researcher in the field cannot prescribe ideal ethical practice, since what will be observed and noticed can only be foreseen in a very general way. The researcher therefore needs to be continuously mindful of possible violations of the identities of the persons observed during the observations (Mulhall, 2003). Before carrying out the pilot study that preceded Study IV, ethical advice was sought from the Ethical Advisory Board in South East Sweden. Since Study I was a systematic review, no ethical approval for the study was sought. However, of the nine RCTs included, five reported obtaining ethical approval and seven studies reported informed consent from the participants. One study failed to report ethical approval or informed consent.

Results

Evaluation of the effects of non-pharmacological nursing interventions

The systematic review (Study I) compiled nine studies (Table 4) and divided the interventions into clusters, depending on the type. The effects of the interventions were then evaluated. The six types of interventions contained 1-2 studies each, i.e. sleep hygiene, music, natural sound and vision, acupunctural stimulation, relaxation, massage and aromatherapy. Only interventions such as listening to music/natural sounds or viewing instrumental music videos, massage and acupunctural stimulation revealed large effects on sleep. However, evidence of the interventions was very low.

Music/natural sounds or viewing instrumental music videos

Two studies investigated the effect of music or natural sounds on sleep. Listening to music, sounds of lapping waves, rain falling or birds singing, or watching an instrumental music video showing landscapes at bedtime had a considerable effect on the total score in the Richard Campbell Sleep Questionnaire. The questionnaire consists of self-reports on sleep depth, sleep onset latency, awakenings, time spent awake and sleep quality. Williamson et al. (1992) found an increase in sleep depth and a decrease in sleep onset latency although the latter was statistically non-significant. However, both studies (Williamson, 1992; Zimmerman et al., 1996) showed improved sleep quality.

Massage

Two studies used massage to improve sleep. Massage had a large effect on sleep efficiency and total sleep time measured by PSG. However, only small effect were seen on sleep onset latency (Richards, 1998). Soden et al. (2004) gave massage to patients with advanced cancer and found a significant difference between groups regarding the total score on the Verren and Snyder-Helpen sleep scale ($p = 0.02$). Verren and Snyder-Helpen (VSH) is an eight-item scale. Answers are given on a

visual analogue scale (100 mm). The items include aspects such as number of awakenings, total sleep time, time spent awake, sleep onset latency, concerns regarding awakenings/sleep onset latency and refreshment in the morning (Richardson, 2003).

Acupunctural stimulation

Acupunctural stimulation was given using magnetic pearls on specific points of the ear (Suen et al., 2002) or by transdermal needles in the arms (Kim et al., 2004). Kim et al. (2004) used subjective measures, such as the Athens Insomnia Scale, the Insomnia Severity Index (modified, including only five items) and the Morning Questionnaire. The intervention had an effect on sleep onset latency ($d = -0.42$) and total sleep time ($d = 1.56$). Suen et al. (2002) measured sleep using actigraphs and found considerable effects on sleep efficiency ($d = 0.77$), and mid-night awakenings ($d = 0.72$), compared to Junci Medulla treatment. The effects on sleep onset latency, sleep efficiency and mid-night awakenings of magnetic pearls compared to Semen Vaccariae treatment were small to moderate.

Sleep hygiene

All the studies included in the systematic review (Study I) were carried out in a clinical environment, even if only two studies focused on limiting disturbing factors in the environment. Environmental factors that impact on sleep include light, noise, time spent in bed and timing of care provision. This was emphasised in particular in the studies using sleep hygiene protocols. In both studies investigating the effects of sleep hygiene (Alessi et al., 2005; LaReau et al., 2008) an effort was made to reduce nocturnal interruption of sleep and to cluster nursing care. Furthermore, in the study by Alessi et al. (2005), one of the main components of the intervention was to stay out of bed between 8am and 8pm. It was found that time spent in bed was reduced during the day, as was daytime sleeping. Participants in the intervention group had more exposure to bright light (>1000 lux) and pursued physical activities for an average of 45 minutes per day. Nighttime rounds by staff were reported to be once an hour. Incontinence care or turning was done approximately every four hours. No statistically significant improvements in light/noise levels at night were found (Alessi et al., 2005). LaReau et al. (2008) failed to report the interval between nursing care at night. Most effort was put into improving falling asleep, improving sleep quality and increasing sleep maintenance. The participants were able to choose between personal hygiene, massage, straightening bed linen, having a bedtime snack, minimising bedside conversations, darkening the room, temperature control or media use. Personal hygiene was the most preferred intervention. All the interventions were

offered at bedtime and there was no report of what happened during the day (LaReau et al., 2008). Evidence of using sleep hygiene was low and only small effects were found.

Summarising the results of Study I, there is little evidence of the use of non-pharmacological interventions in healthcare settings. However, large effects on several sleep measures were found when using massage, acupunctural stimulation and music/natural sounds or music videos for sleep promotion. Massage was used in two studies although in the study by Soden et al. (2004) only thirteen patients in hospice care received massage. In the study by Richards (1998), 24 male patients in an ICU received massage. The samples are thus small and most patients were men. Acupunctural stimulation was used among elderly persons (Suen et al., 2002) and at a stroke centre (Kim et al., 2004). The mean age was over 60 in both studies, indicating that the results are valid among the elderly. The use of music/natural sounds or music videos was found in two larger studies (Williamson, 1992; Zimmerman et al., 1996). However, both studies were in an ICU context and only included patients who had undergone CABG, which could restrict the generalisability of the results. Sleep hygiene had small effect on sleep. However, the studies that tested sleep hygiene differed in the sense that Alessi et al. (2005) produced a protocol that structured the full twenty-four hours, while LaReau et al. (2008) focused on the night hours.

Measuring insomnia symptoms in the elderly

Observing the variety of measures used in empirical studies (Study I), and the appropriateness of the measures used, the focus was on MISS (Study II). This is a brief instrument and has not been tested previously among the elderly. If MISS is found to be reliable for screening among the elderly, the instrument could be a good choice in a clinical setting.

It was assumed that MISS measured one underlying construct – insomnia. The inter-item correlations were 0.548, 0.608 and 0.616, showing a high correlation. Corrected item-total values were used to judge the homogeneity of the scale. These were found to be 0.645, 0.649 and 0.695. An item should correlate with the total score above 0.2, which was achieved (Study II). The floor and ceiling effects were 6.6% and 0.6% respectively. The criterion validity, i.e. how well MISS correlated with the proxy gold standard, was tested. The results from the test are illustrated in an ROC curve (Figure 4).

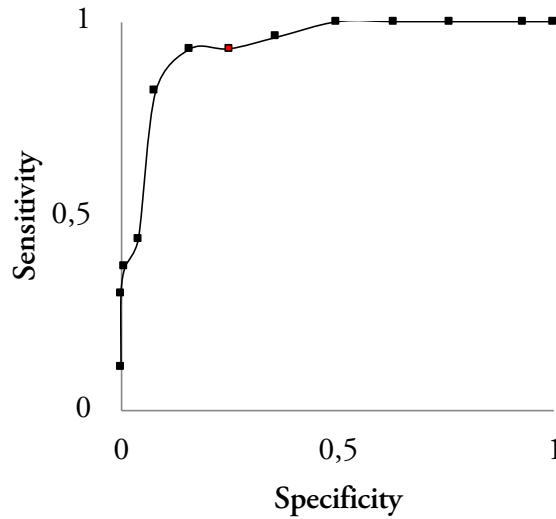


Figure 4. ROC curve of MISS in persons >65 years. Cut-off ≥ 7 is marked with a red square.

The area under the curve was 0.94 (95% CI: 0.90-0.97; $p < 0.001$). This indicated good correspondence between the proxy gold standard and MISS. According to Youden's index, the most optimal cut-off point was at a score of ≥ 7 (Table 5). Furthermore, sensitivity, i.e. the ability to correctly identify persons with insomnia, was 93% and the specificity, which is the ability to distinguish those who do not have insomnia, was 84% at a cut-off figure of ≥ 7 points.

Table 5. Prevalence, sensitivity and specificity at different cut-offs in Study II, (n = 497).

Cut-off value	Prevalence	Sensitivity	Specificity	Youden's Index
≥ 5	40.6%	0.96	0.64	0.61
≥ 6	30.2%	0.93	0.75	0.68
≥ 7	21.7%	0.93	0.84	0.76
≥ 8	13.1%	0.82	0.92	0.73

Of the 548 persons >65 years included in Study II, 51 failed to fill in all three items of MISS. Of the 497 who completed MISS, 21.7% experienced insomnia if ≥ 7 points on MISS was applied as a cut-off. The main difficulty stated by the participants was maintaining sleep (18.6%) (Table 6).

Table 6. Prevalence of insomnia symptoms as measured by MISS (Study II).

	Participants (%) ²	Missing data (%)
Difficulties initiating sleep ¹	78 (14.3)	11 (2.0)
Difficulties maintaining sleep ¹	102 (18.6)	22 (4.0)
Not being refreshed by sleep ¹	80 (14.6)	44 (8.0)

¹Severe or very severe difficulties, ²Percentage based on n = 548.

Of the 886 questionnaires that were sent out, 38.1% were not returned. A drop-out analysis was therefore performed to investigate if the non-participants differed significantly from participants in terms of gender, age or disease. The analysis showed that non-participants were frequently older, suffered from cardiovascular diseases and more often had diabetes type 2 and cataracts (Table 7). No differences between participants and non-participants were found regarding gender, Parkinson's disease, cancer, dementia bipolar disorder or depression.

Table 7. Characteristics of non-participants compared with those who returned the questionnaire in Study II, n = 886. Percentage in brackets.

	Non-participants n = 338	Participants n = 548	Missing cases	p-value
Gender			-	0.177
<i>Man</i>	128 (37.9)	234 (42.7)		
<i>Woman</i>	210 (62.1)	314 (57.3)		
Age-group			-	<0.001
65+	96 (28.4)	265 (48.4)		
75+	130 (38.5)	223 (40.7)		
90+	112 (33.1)	60 (10.9)		
Hypertension	115 (34.0)	142 (25.9)	10	0.023
Angina Pectoris	60 (17.8)	62 (11.3)	-	0.009
Myocardial infarction	29 (8.6)	37 (6.8)	9	0.546
Chronic heart failure	26 (7.7)	17 (3.1)	-	0.003
Stroke	19 (5.6)	14 (2.6)	6	0.041
Diabetes type II	36 (10.7)	29 (5.3)	1	0.009
Cancer	48 (14.2)	65 (11.9)	-	0.363
Cataracts	113 (33.4)	96 (17.5)	1	<0.001
Parkinson's disease	1 (0.3)	5 (0.9)	1	0.406
Dementia	3 (0.9)	2 (0.4)	6	0.343
Depression	49 (14.5)	64 (11.7)	-	0.264
Bipolar disorder	1 (0.3)	1 (0.2)	3	0.928

As regards the other questions in the USI-25, almost one in four persons (22.3%) slept less than six hours per night. Among those who scored 7 or higher on MISS, 67.3% were short sleepers (<6 h). Most of the respondents (48.5%) went to bed

between 10pm and midnight. An equal number of persons went to bed before 8pm (1.5%) and after midnight (1.6%). Commonly reported symptoms (i. e. often/very often) in relation to sleep were a racing mind (19.7%), pain (17.1%), snoring (13.5%), 'creepy-crawly' sensations in the legs (12.6%) and tossing and turning (12%). Most frequently reported were taking naps, which was the case for 24% of the sample. Feeling low or depressed, anxiety, difficulty concentrating or worrying about the next day were only reported by 4-5.8% of the sample.

Comparing the results from Study II with those from Study III, where another sleep measurement was used, both reported difficulty achieving coherent sleep (i.e. *difficulties maintaining sleep* or *having sleep interrupted*) as the major sleep disturbance. In Study III, 81.6% reported having their sleep interrupted during the night, whereas only 16.6% reported inability returning to sleep again after the interruption (Table8). The report of difficulty falling asleep again could be said to correspond with the item *Having severe or very severe difficulties maintaining sleep*, used in Study II.

Table 8. Description of the participants in study III (n = 945).

	Total sample (%)	Missing data (%)
Gender (women)	524 (55.4)	0
Mean age (SD)	73.6 (SD 10.3)	0
Difficulty falling asleep	262 (27.7)	17 (1.8)
Taking or being dependent on medication for sleep	154 (16.3)	12 (1.3)
Sleep interrupted during the night	771 (81.6)	12 (1.3)
Difficulty sleeping (falling/staying asleep) due to moods or tension	236 (25.0)	30 (3.2)
Difficulty sleeping due to pain or itching	165 (17.5)	21 (2.2)
Inability to return to sleep after waking at night	157 (16.6)	17 (1.8)
Waking up early	544 (57.6)	19 (2.0)
Feeling tired and sleeping for more than two hours during the day	72 (7.6)	17 (1.8)
Sleep duration in hours <i>Mean, (SD), [min-max]</i>	6.8, (SD 1.3) [2-12]	119 (13.1)
<i>Short sleep ≤ 5 h</i>	122 (12.9)	
<i>Normal sleep 6-9 h</i>	688 (72.8)	
<i>Long sleep ≥ 10 h</i>	16 (1.2)	
Prescribed sleep medication		10 (1.1)
<i>Never</i>	706 (74.7)	
<i>Sometimes/month</i>	83(8.8)	
<i>Several times/month</i>	12 (1.3)	
<i>Sometimes/week</i>	42 (4.4)	
<i>Every night</i>	92 (9.7)	
General Health		15 (1.6)
<i>Poor/Fair</i>	338 (35.8)	
<i>Good</i>	281 (29.7)	
<i>Very good/Excellent</i>	291 (30.8)	
Functional status		3 (0.3)
<i>Independent</i>	731 (77.4)	
<i>Dependent in 1-5 activities</i>	211 (22.3)	
Cognition		5 (0.5)
<i>≤24 MMSE</i>	68 (7.2)	
<i>>24 MMSE</i>	872 (92.3)	
Mood		34 (3.6)
<i>Low</i>	508 (53.8)	
<i>High</i>	403 (42.6)	

Activities linked to sleep disturbances

In Studies III and IV, lifestyle factors, such as leisure activities, were investigated in relation to sleep. In Study III, a broad range of leisure activities and their link to sleep disturbances were investigated. Outdoor activities, commonly in combination with physical exertion, as well as socio-intellectual activities in the form of playing games or home maintenance, were presented in Study III. Physical outdoor activities together with socio-intellectual activities were statistically significant for sleep ($p = 0.007$ and $p < 0.001$) in the unadjusted model. Individually, five leisure activities, i.e. gardening, strolling in the country, home maintenance, repairing cars/machines and playing chess/cards, were found to be statistically significant for sleep in unadjusted model a (Table 9). However, when the model was adjusted for health, functional ability, gender, mood and age, only playing chess/cards remained statistically significant, with an odds ratio of 1.54 (CI: 1.01-2.35), model b. In the final models (c and d), five interactions with gender were added: strolling in the country x gender, playing chess/cards x gender, repairing cars/machines x gender and home maintenance x gender. Interaction variables were created by multiplying the leisure activities found to be associated with sleep disturbances ($p < 0.05$) in model a. Associations were investigated with and without taking confounding into consideration (Table 9). It was found that gardening, strolling in the country, playing chess/cards, home maintenance and the interaction between home maintenance and gender were associated with sleep disturbances ($p < 0.05$) in model c.

After checking for confounder variables (model d), home maintenance decreased in significance (OR 2.09, CI: 1.07-4.07), as did the interaction between gender and home maintenance (OR 0.33, CI: 0.15-0.75). Other explanatory variables for sleep were poor/fair health, good health and being a woman (Table 9). Persons who reported poor/fair health were over seven times more likely to report ≥ 4 sleep disturbances, allowing for all the factors in the model.

Table 9. Regression analyses between sleep disturbances and leisure activities and leisure activities interacting with gender, adjusted and unadjusted models. Only the final step in the models is shown.

	Model a			Model b			Model c			Model d		
	Associations between individual leisure activities and sleep disturbances						Interactions with gender added to the models					
	Without confounders			Checked for confounders			Without confounders			Checked for confounders		
	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value
Gardening	1.45	1.00-2.08	0.048				1.50	1.04-2.16	0.032			
Strolling in the country	1.47	1.01-2.14	0.046				1.56	1.07-2.29	0.022			
Home maintenance	1.60	1.08-2.39	0.020				2.26	1.17-4.35	0.015	2.09	1.07-4.07	0.031
Repairing cars/machines	2.20	1.28-3.77	0.004									
Playing chess/cards	1.69	1.13-2.52	0.011	1.54	1.01-2.35	0.046	1.61	1.09-2.39	0.017	1.43	0.95-2.17	0.090
Gender (Women)				3.06	2.11-4.43	<0.001	3.63	2.15-6.15	<0.001	4.86	2.75-8.61	<0.001
Age cohorts						0.019						0.043
72 and 78-year-olds				0.91	0.59-1.41	0.666				0.95	0.61-1.49	0.832
81 years or older				1.60	1.04-2.47	0.034				1.56	0.99-2.46	0.056
General health						<0.001						<0.001
Good				3.33	1.99-5.58	<0.001				3.40	2.02-5.73	<0.001
Fair/Poor				6.82	4.14-11.22	<0.001				7.50	4.27-11.81	<0.001
Interaction												
Gender x Home maintenance							0.44	0.20-0.94	0.033	0.33	0.15-0.75	0.008

Note: In **Model a** exercise, gardening, strolling in the country, picking berries, hunting/fishing, home maintenance, repairing cars/machines, knitting/weaving/sewing, playing chess/cards and using/surfing the Internet/playing computer games were entered, missing n = 85. **Model b** included exercise, gardening, strolling in the country, picking berries, hunting/fishing, home maintenance, repairing cars/machines, knitting/weaving/sewing, playing chess/cards and using/surfing the Internet/playing computer games and was adjusted for gender, functional ability, mood, general health and age, missing n = 111. In the unadjusted **Model c** gardening, strolling in the country, home maintenance, repairing cars/machines and playing chess/cards were entered, together with gender and the interactions gardening x gender, strolling in the country x gender, playing chess/cards x gender, repairing cars/machines x gender and home maintenance x gender, missing n = 66. **Model d** (to the right in the table) was adjusted for age, functional ability, mood and general health, missing = 93.

The majority of the participants in Study III were independent in IADL (77.4%) Most of the participants pursued physical outdoor activities (88.3%), socio-intellectual activities (68.7%) and activities with a cultural content (98.8 %), while creative activities were less common (44.6%). Cultural activities, such as reading a daily paper or a magazine, watching television and listening to music, were most common in both good and poor sleepers (Study III). Outdoor activities linked to sleep disturbances were gardening, exercise, picking berries, hunting and fishing and strolling in the country. However, none of those activities remained significant in the regression model when adjusted for age, gender, mood, physical function and general health. In Study III, the most common sleep disturbance was having sleep interrupted during the night (81.6%), followed by difficulty falling asleep (27.7%) and difficulty sleeping due to moods or tension (25.0%).

In Study IV, the activity concept was broadened to cover everyday activities, including routines such as meals, dressing or domestic chores. The assumption made *a priori*, based on previous research, was that an active lifestyle could enhance nocturnal sleep and that sleep in RCFs commonly is disturbed. The qualitative approach of Study IV revealed *the rhythm of the unit is the pace of life*, as an overarching theme of the content. Six categories embraced by the theme were found: *Sleep – in and out of pace; Time to go outdoors; Reaching for the outside world or withdrawing from it; Rhythm of mobility – mobility or immobility; Letting time go slowly and Able and willing to socialise* (Figure 5).

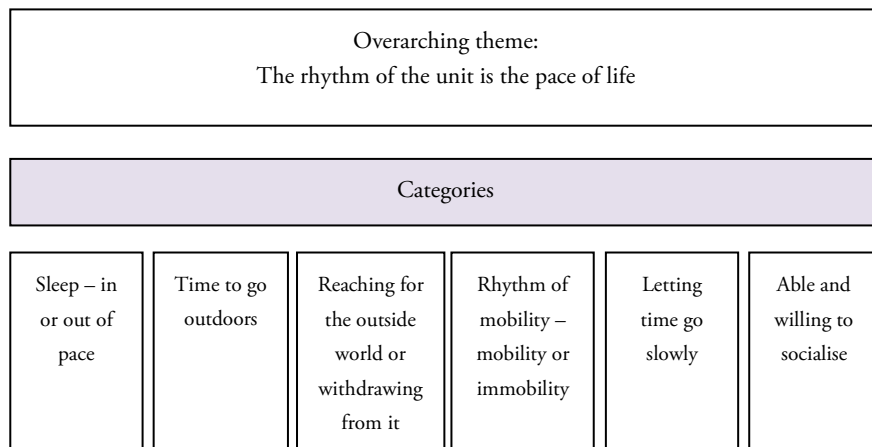


Figure 5. The overarching theme and the six categories of Study IV.

In *Sleep – in or out of pace*, several of the residents said that if they experienced any difficulty sleeping, then it was difficulty initiating sleep (Study IV). The difficulty commonly originated from disturbing thoughts. Another reason for not falling asleep was the need to speak to the night staff. It was stated that it felt unsafe if the gate on the bed was not up. The resident felt compelled to stay awake and make sure the

night staff did not forget to do this. When they found it difficult to fall asleep, or if they had had mid-night awakenings, some used self-care strategies to get back to sleep. This could be stimulus control, where the resident sits up for a while and then tries to get back to sleep. One resident also stated that she would get up and have a snack when awoken. This made getting back to sleep easy. Sometimes the staff would help the residents with these strategies and assist them.

Contrary to the *a priori* theory, the respondents in the interviews (Study IV) regarded their sleep disturbances as minor or non-existent. Several residents stated that their sleep had become longer, more effective and regular since moving into the RCF. Noise from the staff at night was acknowledged although this was considered comforting as the residents then knew that someone was always nearby and would be able to help them if necessary. The residents who considered their sleep to be satisfactory were quite independent. They found their own activities to pass the time, they had social contacts outside the unit and they decided where they spent their time. They were less impeded by the routines of the RCF. Instead, they benefited from the meals and coffee schedule during the day, which created a regular pace that they could follow.

Some residents (Study IV) felt that the lack of activities during the day contributed to excessive daytime sleep. This was further emphasised in the category *Sleep – in and out of pace*. Several residents slept or rested in the day room and the majority of them were physically impaired and unable to move without assistance.

Spending time outdoors was stressed in the category *Time to go outdoors*. This could involve simply sitting in the sun or having someone push the wheelchair instead of walking (Study IV), i.e. outdoor activity with less physical exertion. If any activity was highlighted as being important for sleep, it was the opportunity to be outdoors. The opportunity to be outdoors was considered to be restricted at the RCF. In the category *Reaching for the outside world or withdrawing from it*, cultural activities among residents were described (Study IV). Reading was also appreciated by the residents and this took place as a solitary activity in the apartment or as a joint activity in the day room. Listening to the radio was stated to be a way of lessening the feeling of loneliness. Television was described as a pastime or as part of the routine when going to bed (Study IV).

Physical activities at the RCF, captured in *Rhythm of mobility – mobility or immobility* (Study IV), mostly took the form of indoor walking back and forth between the day room and the apartment. Mobile residents usually walked to the day room in time for meals and coffee and thus had several walks during the day. Most of the time was spent indoors doing less strenuous activities. This was further emphasised in *Letting time go slowly*. During the day, many residents would spend most of their time in the day room and most of them were dependent on others to move around. The residents were put in the day room after breakfast and were moved when it was time for coffee

or a meal. The day passed slowly; the residents sat in silence in front of the television without any noticeable interest in the programmes or sometimes at an angle where watching the television screen was impossible. Many residents slumbered in the day room, sitting in their wheelchairs. When the residents were asked about this phenomenon, resting in the day room was considered to be a result of lack of activities or waiting for something to happen (a meal or coffee for instance). On the other hand, it was also stated that sitting in the day room offered company or that you could see other persons and thus avoid feeling lonely.

Socio-intellectual activities, such as the enjoyment of playing games, were also emphasised by residents in Study IV in the category *Able and willing to socialise*. Social activities commonly took the form of conversations during coffee time (Study IV). Observations and interviews showed that several residents found this troublesome due to impaired hearing, unless staff were present and could repeat phrases or moderate the discussion. Even though the units were general, several residents had cognitive impairments, which meant they had difficulty communicating with other residents. At some units pets were allowed. This also made it possible to include physical contact in the social interplay. Residents, recognised as those who had difficulty communicating with other residents, took a lot of interest in the animals, patting, watching and talking to them.

Gender differences in relation to sleep

In Study III, it was found that the highest odds ratio of having difficulty sleeping was among those who reported poor/fair health (OR 6.82, CI: 4.14-11.22), followed by those in good health (OR 3.33, CI: 1.99-5.58). Furthermore, women yielded three times the odds of poor sleep (OR 3.06, CI: 2.11-4.43) compared with men (Table 9, Model b). An investigation of interactions between gender and activities revealed that interaction between gender and home maintenance had an OR of 0.33 (CI: 0.15-0.75) in the model checked for confounding variables. The interpretation is that being a man and being active did not increase the effect on sleep disturbances. Persons aged 81 years or older were 1.60 times likely to report poor sleep compared with those of retirement age (60- and 66-year-olds). Of those aged 81 years or older, 58.4% were women. Taking into account poor/fair health and feeling low, women were in the majority (61.2% and 56.7%). In Study II, 21.7% were found to have insomnia. Of these, the majority (69.4%) were women. Women also reported being in pain and having a racing mind, often or very often in connection with sleep, to a greater extent than the men. On the other hand, men reported snoring more often than women (Study II).

Discussion

Methodological considerations

The aim of the thesis was to test a tool for assessing insomnia symptoms in elderly persons and to investigate late-life insomnia in terms of associated factors and evidence of non-pharmacological interventions in healthcare settings. The broad approach encouraged different research methods. The quantitative research paradigm is predominant in the thesis, represented in Studies I-III. Quantitative research is needed in order to test relationships, evaluate interventions and generalise findings, (Pruitt & Privette, 2001). Furthermore, to establish the best available research evidence, evidence about a certain research problem needs to be gathered, evaluated and synthesised to allow conclusions to be reached regarding the effectiveness of the practices. This is usually done through a systematic review, a meta-analysis or a meta-synthesis (Polit & Beck, 2008). Qualitative research on the other hand has the purpose of revealing meanings, concepts, definitions, characteristics and descriptions of things.

Reliability

The reliability of a study depends on whether an appropriate research design was chosen, (Altman, 1999), i.e. if the research question can be answered by the chosen method. Applying this to the systematic review (Study I), both the accuracy of data collection in the studies included and the accuracy of the literature search and selection of articles could affect the reliability of the findings. Of the studies included in the systematic review (Study I) the sample sizes ranged from 30 to 120 participants, which could be considered small. However, the strength of Study I was the critical appraisal, where the emphasis was on the methodology of the studies that were included. Another benefit was that the twelve studies that were excluded after critical appraisal are shown, as well as the reasons for their exclusion. This transparency allows the reader an opportunity to reappraise the selected/rejected studies. A further strength of Study I is that the results are based on RCTs. According to Polit and Beck (2008), systematic reviews of RCTs are the most reliable sources for estimating strength of evidence. RCTs are recognised as the best and most definitive

method to demonstrate the effectiveness of an intervention (Kazdin, 2003). The compilation of several RCT studies ensures a reliable result regarding the effects of the interventions although a restricted number of studies and differences in measures and timeframes prevented a meta-analysis of the studies.

In Study II, psychometric testing of the MISS instrument was performed according to the traditions of classical test theory. Within Classical Test Theory (CTT), coefficient alpha is widely used when determining the reliability of a scale. Streiner (2003a) states that this is because coefficient alpha is the only reliability index that does not require several distributions of a questionnaire or several raters (Streiner, 2003b). Since Study II was a cross-sectional study with only one measurement point, the use of coefficient alpha was appropriate.

The formula for calculating alpha takes the number of items within the scale into account. The higher the number of items, the more reliable the scale (Hobart et al., 2004). Further assumptions of CTT are that reliability increases with the number of items on the scale and if correlations between the items increase (Streiner & Norman, 2008). This implies that adding items to a scale could increase reliability, as would the addition of items similar to those already included in the scale. MISS contains only three items but despite this it was found to have an alpha of 0.81, which ensures the high internal consistency of the scale.

Other weaknesses of using CTT is that the reliability of a scale cannot be transferred to a different group of individuals and the psychometric properties need to be re-established (Streiner & Norman, 2008). Whatever the circumstances, coefficient alpha is a characteristic of the test scores and not the test itself (Streiner, 2003b). The psychometric properties of MISS have been tested previously in the general population (20-64 years) in Sweden. An alpha of 0.73 was then found (Broman et al., 2008), which is slightly lower than in Study II but acceptable. Furthermore, corrected item-total values in the sample of elderly persons (Study II) ranged between 0.64 and 0.7, which was higher than for the general population (range 0.54-0.57) (Broman et al., 2008).

For Study III, stepwise logistic regression analyses were used. To develop a predictive model, stepwise regression is appropriate (Kirkwood & Sterne, 2003). Tabachnick and Fidell (2007) argue that the stepwise approach should be used for model-building rather than model-testing. The approach is useful for exploratory purposes. The elimination of redundant variables makes the output more stringent. However, the use of statistical regression (generically called stepwise) is controversial since the entry of variables is based solely on statistical criteria (Tabachnick & Fidell, 2007). The derived model tends to be over-optimistic, with p-values that are too small and confidence intervals that are too narrow (Kirkwood & Sterne, 2003). In order to reduce the risk of chance associations between exposure variables and the dependent variable, variables for the model were chosen carefully and only variables found to be

associated significantly with sleep disturbances ($p < 0.05$) were entered. The sample in Study III was fairly large ($n = 945$), which could minimise the risk of misleading interpretations. Furthermore, the sample should be representative of the population of interest. An advantage of backward stepwise regression is that the first step equals a standard regression, including all variables. This facilitates the check on the initial correlations. Another advantage of applying a stepwise procedure is that variables that contribute to a small degree are excluded (Altman, 1999). Otherwise, variables that correlate highly with each other could explain the variation to a large degree without being strongly correlated to the outcome variable. The stepwise regression was found to be suitable due to the lack of *a priori* theory ranking the importance of the individual leisure activities. The purpose of the analysis was to explore whether any activities were of importance to sleep disturbances and what those activities might be. An alternative analysis could have been hierarchical regression analysis. However, this requires a strategy or a logical order for entering variables (Norman & Streiner, 2008).

Validity

Internal validity refers to the extent to which an intervention or independent variable is considered to account for the observed effects (Kazdin, 2003; Polit & Beck, 2008). There are two kinds of search errors that can be made in a literature search; if irrelevant search terms or exploding concepts are included, the search will be broadened and a large number of publications beyond the aim of the study will be found (Sampson & McGowan, 2006). In Study I, only seven search terms were used and 61 publications were identified, of which 26 were duplicates. The high number of duplicates could be an indication that the accuracy of the search was high. Furthermore, only eleven of the identified publications were excluded because they did not correspond to the aim of Study I.

The other search error is related to the collection of relevant studies due to spelling errors, truncation errors or missing relevant MeSH terms (Sampson & McGowan, 2006). A weakness of Study I is the choice of search terms. When defining the search strategy, concepts were identified that could be searched for separately and then combined with each other. In Study I, the concepts were retrieved by using the appropriate controlled vocabulary for each of the chosen databases, e.g. in Medline, MeSH terms should be used. However, search terms found to be indexed in one database were not found in another. Instead of using another suggested term, the researcher stuck to the original search term but used it as a free text word in the search. An example is the suggested use of the term 'alternative therapies' to replace 'complementary therapies' in Cinahl. It is recommended that concepts are searched for according to the indexed vocabulary of the database and as non-indexed terms (Sampson & McGowan, 2006). It is also appropriate to tailor the search to other

databases. By choosing not to use the suggested indexed search term, the number of hits could have been reduced. Furthermore, the limited number of search terms and the very specific search terms that were chosen in combination with the inclusion criteria make the investigated area of sleep promoting interventions quite narrow. This implies that there are still aspects that need to be evaluated further. An example was the use of nurse-led CBT not covered by the review.

It should be noted that although only RCTs were included in Study I, the studies were not performed in laboratories. Instead, as in all effectiveness research, the outcomes are obtained in clinical settings where the usual control procedures are not implemented (Kazdin, 2003). Another aspect is that due to the participants' severe illnesses, large amounts of pharmaceuticals were administered at the same time as the intervention. The studies investigating the effects of sleep hygiene (Alessi et al., 2005; LaReau et al., 2008) reported pharmaceuticals that were administered in parallel to the intervention, as did both studies concerning music/natural sound and music videos (Williamson, 1992; Zimmerman et al., 1996). One of two studies of acupuncture stimulation and one of two studies of massage also report pharmaceuticals administered to the patients. Pharmaceuticals, time spent in bed, the whereabouts of the participants during the day and the number of sleep interruptions could have affected several of the sleep measures, thus reducing or increasing the effect of the interventions. Richards (1998) reported that blood pressure was measured automatically 1-4 times per hour, which could have interrupted sleep. Suen et al. (2002) reported daytime sleepiness and a need to nap but not the extent. These are factors that could clearly affect sleep and although they cannot be checked for in a clinical setting, it is important to take note of their occurrence and how they might impact on the outcome.

Testing an assessment tool (Study II) implies a quantitative approach to assess internal and external validity. However, a qualitative approach could have been adopted to investigate the face validity (DeVon et al., 2007). Face validity cannot tell if a tool measures the construct of interest but it does provide information about how the items might be interpreted and responded to by potential participants (DeVon et al., 2007). This is frequently carried out while constructing a measurement tool. The items were regarded as clear and understandable, and consequently the face validity of MISS was not called into question.

In Study III, consideration of confounding variables is related to the internal validity of the study. General health, age, gender, functional status, mood and cognition were thought to influence the links between leisure activities and sleep disturbances. Other variables that could also influence are marital status and socio-economic characteristics, such as income, level of education and housing tenure (Arber et al., 2009). The selection of variables was based on what we thought would have the greatest impact on the links between leisure activities and sleep disturbances in the

elderly. Furthermore, variable screening based on statistical significance and stepwise variable selection involves multiple comparison problems that lead to unreliable models when several variables are analysed (Harrell et al., 1996). It is suggested that the minimum number of cases in a multiple logistic regression is $N = 10k/p$; p being the smallest proportion of negative or positive cases in the sample and k the number of independent variables (Park, 2013).

Missing cases could serve as a threat to internal validity. In Studies II and III, there was a risk that because of frailty, illnesses and mortality the least healthy persons would not be represented. Samples for Studies II and III were taken from SNAC-B. SNAC-B applied a randomised selection from the four younger age clusters (60, 66, 72 and 78 years) and total inclusion of the clusters of persons aged 81, 84, 87, 90, 93 and 96+ years, in order to gain a sample cross-section of the ageing population. Furthermore, in Study II, a drop-out analysis was performed, describing some of the characteristics of the missing cases. Missing cases were commonly older persons ($p < 0.001$) and persons with stroke ($p = 0.041$), chronic heart failure ($p = 0.003$), hypertension ($p = 0.023$), angina pectoris ($p = 0.009$), diabetes type 2 ($p = 0.009$) or cataracts ($p < 0.001$). Sleep disturbances have been found to be associated with several diseases, such as cardiovascular disease, diabetes, depression and bipolar disorder, arthritis, neurodegenerative diseases, chronic obstructive lung disease (Ancoli-Israel, 2010) and visual diseases such as cataracts (Kim et al., 2012). Some subgroups that may have severe sleep disturbances could be under-represented in the sample.

Conclusion validity concerns the quantitative evaluations that influence the conclusions made (Kazdin, 2003). In order to avoid type I error, the level of significance applied was $p < 0.05$. This level was suggested by Fisher in 1926 and has now become the norm (Shadish et al., 2002). However, the probability level of < 0.05 does not imply that variables with a higher value do not correlate. It should merely be seen as a dichotomisation of the probability. The benefit of reporting p-values is telling the role of chance in the observed effects (Shadish et al., 2002). The studies included in the systematic review (Study I) commonly reported p-values and mean values rather than the CI. Since a p-value is merely the probability of rejecting the null hypothesis when it is actually true (type I error) it does not provide any information about the uncertainty of the effect size (Kalinowski & Fidler, 2010). The effect sizes focus on the magnitude of covariance (Shadish et al., 2002). A commonly used measure of effect size is Cohen's d . However, the best way of reporting effect size is by reporting Confidence Intervals (CIs). The advantage of using CIs in reporting is that it provides an account of the uncertainty of a certain effect. Effect sizes do not tell if an effect is important. The clinical importance of an effect depends on our own judgement (Kalinowski & Fidler, 2010). Failure to reject the null hypothesis when it is actually false is called type II error. The risk of making type II errors was reduced in Studies II and III by including large samples and an amalgamation of response alternatives for individual variables in order to create larger groups for the sub-

analyses. The latter was applied to the variable health, where five response options were reduced to three, and the age cohorts, which were transformed from ten clusters to three.

To increase the statistical conclusion validity, there should be an adjustment for correlated covariates in the analysis and selection of covariates that are non-redundant with other covariates. In Study III, multicollinearity was checked using Spearman's rho and VIF. Floor and ceiling effects should be avoided. In Study II, the floor and ceiling effects were found acceptable (Hobart et al., 2004). However, in Study III several measures were dichotomous. According to Hobart et al. (2004), the percentage of the most frequently endorsed response alternatives should be less than 80%. This was fulfilled in all dichotomous variables except reading the paper and magazines, watching television and listening to music, which were activities pursued by more than 80%. The opposite was found for hunting/fishing, painting/drawing or pottery and playing an instrument, where more than 80% abstained from these activities.

Construct validity refers to what is causing an effect and why (Kazdin, 2003). Due to the design of Study III, no causal relationships could be found. However, in Study I the inclusion of RCTs meant that the effects on sleep measures could be derived from the interventions. In psychometric testing, construct validity relates to the ability of a scale to measure a hypothetical construct (Streiner & Norman, 2008). MISS (Study II) proved to be satisfactory with regard to sensitivity and specificity as it seems to pick up on persons with insomnia symptoms well. The items in MISS also correspond to the cardinal symptoms of insomnia (Morin & Espie, 2004). Due to the short scale and the wording of the items, a weakness of MISS is that the duration of the symptoms cannot be estimated and nor can it distinguish between comorbid insomnia and insomnia disorder.

External validity is the ability to generalise results to persons other than those in the specific study (Kazdin, 2003). A possible limitation of the results from Studies II and III is that they only included elderly persons from a specific region in South East Sweden. Another limitation concerning Study III is the activities that were investigated. In another country or another geographical region of Sweden, it might have been appropriate to investigate other activities (Leung et al., 2011; Nilsson et al., 2006). The sample in Studies II and III is representative of the ageing population in Sweden (Lagergren et al., 2004), which is an advantage when investigating factors that affect sleep disturbances. The disadvantage of the data collection procedure is that the most fragile elderly persons do not have the strength or willingness to participate. This is mirrored in part by the large number (77.4%) of physically independent persons with very good/excellent health and mood who were included in Study III. In Study II, the drop-out analysis showed that participants were commonly younger and fewer had diabetes or cardiovascular diseases.

Trustworthiness

The trustworthiness of qualitative research can be evaluated by means of credibility, dependability, confirmability and transferability (Guba, 1981). *Credibility* refers to the confidence of truth of data (Polit & Beck, 2008). Triangulation of data was used (Study IV). The reasons for adopting data triangulation were the assumption that each method reveals different aspects of the phenomena being studied and by using several data collection methods, different and complementary results could be found (Quinn-Patton, 1999). In Study IV, data collection was initiated by observations and individual interviews were then used to enrich the observational data. The procedure of starting with observations and continuing with interviews was repeated at all the facilities.

Dependability refers to stability of data (Polit & Beck, 2008). Qualitative data is dependent on the context and the cases that are studied (Quinn-Patton, 1999). The results from Study IV are limited because observations were carried out during the daytime, in the day room only and during the autumn and winter. Outdoor activities are more common during the summer, which could explain the scarcity of outdoor activities. However, knowledge of outdoor activities and sleep was emphasised through the interviews. The choice of only performing observations during the daytime affects the data on nighttime sleep. All data concerning nighttime sleep was collected via the interviews. The selection of participants for interviews may have also produced a limitation, since those who were cognitively impaired, or were in particularly poor health at the time, were excluded. A possible complement would have been to use sleep questionnaires, diaries or actigraphs to collect nighttime sleep data. The use of actigraphs could also have enabled the collection of sleep data from those persons with cognitive impairments and poor health.

The presence of an observer in a specific setting has implications and consequences for what takes place, since the observer interacts with and thus has some impact on the persons being studied (Emerson et al., 1995). These difficulties can be addressed by advocating long-term observations (Quinn-Patton, 1999). The effects of possible adverse behaviour due to the presence of the researcher on site were possibly avoided or restricted by deciding to remain in each setting for several weeks. Data collection lasted for six months.

Confirmability refers to the degree to which the results could be confirmed by others and that the results are not biased towards the researchers (Farrelly, 2013; Polit & Beck, 2008). In Study IV, a protocol for the observations was followed, specifying what should be observed. Conformity with the protocol was checked at three time points (September, November, and December) during the data collection by having two persons perform the observations. The observers' field notes were then compared (inter-observer reliability). There was a good degree of correspondence between the

notes made by the two observers. To further increase confirmability, quotes from the respondents were reported in the findings.

Analysis of the field notes and interview transcripts was made by four researchers with different clinical backgrounds (medical or surgical somatic care and elderly care). The researcher performing the data collection had no prior experience of working in municipal elderly care, which could have facilitated unbiased collection of data. One of the units had been observed one year earlier as part of a pilot study and the environment, staff and several of the residents were familiar to the researcher, although there were no personal relationships. Interviews were carried out after the observation periods at each unit. This enabled the researcher to ask the residents about specific activities or events that had been observed as a complement to the predefined interview protocol.

Transferability refers to the extent to which the results could be applicable in other settings. This cannot be evaluated by the researcher and it is up to the reader to decide. However, it can be enhanced by offering a thick description of the methods used, the study time lines and the methodological choices and procedures (Polit & Beck, 2008). Data for all residents except the bedridden were collected through the observations (Study IV). However, when performing the interviews, it was the residents who were physically and cognitively stable who were approached. Consequently, the activities and perceptions of sleep habits among the more dependent residents were not investigated.

General discussion of the results

The results from this thesis suggest that MISS is appropriate when screening for insomnia although it is important to consider the clinical usefulness. Pursuing socio-intellectual activities was found to be associated with fewer sleep disturbances, which should be taken into account when promoting sleep using daytime activities, especially in RCFs. The influence on sleep of the physical and psychosocial care environment in RCFs and the rhythm of life in the RCF are also key components.

Limited evidence of non-pharmacological nursing interventions was found and this could be due to the limited size of the studies and the number. Individual studies in the systematic review (Study I) however show medium to large effects on sleep. An interesting aspect is that in most of the studies the interventions were delivered during a short period, which raises the question of the duration of the effects. Finally, in Studies II and III women reported more sleep disturbances than men. Although it should be noted that the samples in Studies II and III most likely overlap to a certain degree since respondents were found through SNAC-B, two different questionnaires

were used, which confirms the finding. Sleep disturbances are commonly a health issue for women and tailored interventions for women could be an interesting approach.

Sleep scales can be an easy and important method for noting sleep disturbances. Performing regular sleep assessments has been emphasised previously (Lorenz et al., 2011; Redeker et al., 2011). However, for implementation, knowing which sleep scale to use and when and why need to be clarified. In Study II, the measurement properties of MISS were evaluated in elderly persons. Previously, the scale has only been evaluated in the general population (20-64 years) (Broman et al., 2008). The discriminating abilities of MISS in elderly persons (>65 years) showed slightly higher sensitivity (93% vs 82%) and lower specificity (84% vs 86%) compared with the general population (Broman et al., 2008). However, different measures for the standard criterion were used in the studies. Furthermore, Broman et al. (2008) found that ≥ 6 points on MISS should be used as a cut-off for the general population, while ≥ 7 were found in Study II.

When investigating sleep among elderly persons, Moul et al. (2004) emphasise the use of short, simply worded instruments. MISS accomplished this and it was found to be appropriate when screening for insomnia in elderly persons. MISS can thus be considered a valuable instrument for initial screening. Its brevity increases the chances that it will be used. However, it cannot be used for diagnosing or distinguishing between comorbid insomnia and insomnia disorder. If the insomnia is caused by another underlying disease, this cannot be detected. MISS should therefore only be used for initial screening. High scores in MISS require further investigation.

A shortcoming when using sleep scales are that they are retrospective. Even if the scale can be summarised quickly, thus providing a picture of the disturbance, it might be difficult for the individual to remember their sleep over the previous 2-4 weeks (Spielman et al., 2011). An advantage of MISS (Study II) with regard to retrospectiveness is that the scale does not define a specific period of time and it can be used as a here and now measure. In Study I, other measures of sleep were used, such as sleep diaries or objective measurements. Contrary to sleep scales, diaries are prospective and the person fills in the items night by night, facilitating remembrance of how their sleep has been (Spielman et al., 2011). The use of objective measures could be helpful when investigating sleep in persons with cognitive impairments, who would have difficulty filling in a questionnaire or diary.

Although several instruments for assessing sleep are available, the clinical use of these instruments seems to be limited. In a study by Ye et al. (2013), clinical nurses draw attention to the lack of available instruments for assessing sleep disturbances in hospitalised patients. There is perhaps not a lack of instruments but rather a lack of knowledge of suitable scales. As emphasised in Study II, for an instrument to be useful in a clinical setting it should be short, direct and easy to interpret. The

usefulness of MISS has not been tested from a clinician's perspective although our study (Study II) shows that it has good discriminatory ability and it can be easily answered by the elderly persons themselves. MISS picks up on the occurrences of insomnia in the target population and succeeds in classifying persons accurately, i.e. the scale has a high diagnostic specificity (Moul et al., 2004).

It was found that socio-intellectual activities, such as playing chess/cards and pursuing home maintenance, were associated with fewer sleep disturbances. Previous research has found that in younger humans and in animals, the need for sleep is dependent on brain plasticity during prior wake. It has been suggested that decreased sleep needs among the elderly may be caused by a reduced opportunity to learn and less exposure to novel experiences (Cirelli, 2012). Expanding on extrinsic factors, Moul et al. (2004) point out that retirement from work commonly results in fewer scheduled activities and monotonous daily routines, which could increase the risk of insomnia. Playing chess/cards was the only activity that remained significant after adjusting for age, gender, general health, functional status and mood. It has been hypothesised that if a specific area of the brain is exposed to high learning or synaptic potentiation, there will be an increase in slow wave activity (occurring during deep sleep) in that particular area during subsequent sleep (Tononi & Cirelli, 2012). Since elderly persons commonly display decreased deep sleep, this could be a way of improving sleep. Exposure to challenging and novel experiences could possibly trigger homeostatic increases in sleep requirements and thus also in deep sleep (Cirelli, 2012; Tononi & Cirelli, 2012; Vance et al., 2009). Among elderly persons in long-term care facilities (such as the RCFs) behavioural interventions, such as physical and social activities, have revealed improvements in sleep (Chen et al., 2007; Richards et al., 2011). However, when considering the findings of Study III there should be a particular focus on offering mentally challenging social activities. Among elderly persons living in the community, participation in bridge clubs, chess clubs and other such activities should be encouraged.

Home maintenance lost its significance in all adjusted models except when interactions with gender were included. As with playing games, home maintenance was considered to be a socio-intellectual activity. This was based on the assumption that maintenance could sometimes be an activity that requires more than one person, having a home of your own implies being part of a social context and different maintenance tasks could require logical thinking and planning. It can be hypothesised that home maintenance could provide intellectual stimulation and be a marker of autonomy, depending on the task. In an Australian study, the house was considered to be a sign of freedom, independence and autonomy (de Jonge et al., 2011). A sense of self can be preserved through personal appearance, possessions and preferences (Cooney et al., 2009).

The care environment not only signifies the physical environment but also the social and cultural patterns of a hospital unit or RCF (Wijk, 2004). In Study IV, the physical and psychosocial environment of the residents was noted. An aggravating factor found in Study IV was the scarcity of high-intensity light. Daylight was reduced due to awnings or balconies that cast a shadow. The dim indoor environment was accentuated by the fact that observations were made during the autumn and winter, when there was much less daylight. Going outdoors could increase exposure to light although the residents spoke about the difficulty of going outdoors due to code locks that were out of reach or difficult to operate. A further aggravating feature was the actual buildings. All the RCFs included in the study (Study IV) had several floors, thus making it complicated for staff to attend to residents who were out on the patio or in the garden. Important aspects for sleep in the care environment are light, noise, privacy, social interaction and daily routines. Wijk (2004) emphasises this further by focusing on the objective environment (i.e. the physical room) and the subjective environment, such as feelings of homeliness and the possibility of going outdoors. Within person-centred care the care environment is stressed. As regards the environment at RCFs, it has been suggested that modifications to the facility would facilitate daily living (Wijk, 2004). This could involve taking the personal daily rhythm into consideration or the person's preferences about what to do alone or in a group. In Study IV, the routines of the day seemed to be 'socialised' among the residents as well as the staff. According to Ehn and Löfgren (2007), routines can be something personal although they are mostly a cultural phenomenon. They are usually the habits of the persons in a specific group – an institutionalised order that is needed to manage the day. The repeated pattern each day can be perceived as meaningful or as a way of passing the time (Ehn & Löfgren, 2007). In Study IV, the facilities clearly had a daily rhythm but residents who could move unaided would only adapt to part of that structure, which also implied spending more time alone rather than in a group. An ethnographic study performed in Australian nursing homes found that living in an RCF was considered distressing due to the large number of sick, disabled and socially inappropriate people (Fiveash, 1998). Such aspects, coupled with difficulty communicating and not knowing anyone else at the unit, could have contributed to persons preferring solitary activities, as shown in Study IV. Interpretation of the results revealed that residents who were mobile had greater opportunity to choose their activities and more frequently chose to be active during the day. They also found the rhythm of the daily schedule at the RCF to be a way of maintaining a regular diurnal rhythm and they felt that their sleep had improved since they moved in.

Six non-pharmacological interventions were found in Study I. The results were based on just nine studies and evidence for the interventions was sparse. As argued in the methods discussion, since the studies were carried out in clinical settings the aspects that might impact on sleep could not be eliminated entirely and in some respects they

were not checked for either. Another aspect is that the effects of the interventions were measured over a short period, 1-14 days in total but in two studies. It is therefore unclear if they produced any long-term effects or if the patients adopted the procedures and continued after discharge. None of the interventions were delivered for longer than seven days, except two (Soden et al., 2004; Suen et al., 2002), where the intervention was delivered for 3-4 weeks. The short time periods could be an indication that an immediate effect of the interventions was expected. The shortness of the intervention period also implies that the interventions were aimed at reducing transient insomnia, i.e. it was not considered that the hospitalisation or underlying disease could cause long-term sleep disturbances. Cremeans-Smith et al. (2006) found that sleep disruptions, as measured using PSQI, and pain independently predicted functional limitations three months after total knee replacement surgery. In a study by Malmström et al. (2013), persons who had undergone surgery for oesophageal and gastric cancer reported disturbed sleep several years after surgery. Sleep deprivation affected rehabilitation and daytime functioning and resulted in depression symptoms and inactivity. It is possible that nurses should not only focus on preventing transient insomnia but should also emphasise that the illnesses and treatments could lead to chronic insomnia following discharge. Sleep disturbances should be addressed at follow-ups and sleep promotion should be part of rehabilitation. It could be possible that if the interventions found in Study I were delivered for an extended period they could have long-term effects on sleep.

Women reported poor/fair health, low mood and impaired physical ability to a greater extent than men. In the case of mood, 59.3% of the women reported low mood (Study III). It could be assumed that the higher prevalence of sleep disturbances in women was related to poor health. Physical and mental factors, such as medical illnesses, low mood, physical disabilities and poor perceived health, are known to be associated with sleep disturbances (Foley et al., 1999). Environmental and social factors, such as being widowed or being a homemaker, are associated with poorer sleep (Foley et al., 1999; Soares, 2005). Since marital status was not investigated, this cannot be verified or refuted by this study. However, it could have contributed to the observed gender differences. There are obvious differences between the sleep of men and women and tailored interventions for sleep promotion that take into account gender should be considered.

Conclusions and clinical applications

Massage, music/natural sounds or music videos and acupunctural stimulation had a significant effect on several sleep measures (Study I). It is possible that these interventions release tensions and divert the mind from obtrusive thoughts, which are circumstances that are known to cause insomnia and are likely to occur in connection with illness and hospitalisation or a move to an RCF. MISS was also found to be a useful instrument when screening for insomnia in the elderly (Study II). A suitable routine would be to use MISS on admission in order to acquire an understanding of the state of sleep in the patient/resident. Furthermore, leisure activities, particularly socio-intellectual activities such as games or home maintenance, were found to be positively associated with sleep. However, the activities were secondary to general health status and gender, emphasising that insomnia is largely a female health issue. It was also found that home maintenance had greater significance for women than men. An interesting result was that the daily routines in residential care seemed to have a positive effect on sleep. Sleep was reported to have become better after moving to the RCF. Besides the solid rhythm of daily life, the degree of independence was central. Residents who were able to walk or move could choose their activities and they spent more time doing solitary activities than those who were less mobile. Special attention should therefore be devoted to more dependent residents. It is vitally important that the less mobile residents do not remain trapped in the day room all day, with little or no stimulation.

There are three major difficulties regarding sleep promotion in nursing. Firstly, clinical nurses need training in sleep assessment. The sleep of patients is assessed routinely on admission but there is no follow-up (Ye et al., 2013). Working according to the steps described by Willman et al. (2003), an assessment should be followed by a plan of action and suitable interventions that prevent or relieve sleep disturbances. A follow-up that evaluates the effect of the interventions should then follow. Ye et al. (2013) stated that nurses expressed a need for training in the importance of sleep during hospitalisation. This leads to the second difficulty. There is a need to learn more about sleep stages, sleep deprivation (inadequate amount of sleep) and sleep disruption (fragmented sleep) in order to design effective interventions for the sleep disturbances found in a clinical setting. Sleep is possibly a subject that is overlooked in present-day nursing training and practice. Lee et al. (2004) provided a curriculum for undergraduate and graduate nursing education that emphasises sleep and

chronobiology. Even if the curriculum was published almost a decade ago, its implementation in nursing education is limited.

A third difficulty is the limited knowledge among staff regarding the importance of meaningful activities for sleep. In a study by De Bellis (2010), staff in RCFs did not know about or acknowledge the sleep of the residents. Flick et al. (2010) interviewed staff in elderly care about their perceptions of sleep quality in relation to activity. Most staff understood the link between activity during the day and improved sleep quality but refrained from motivating or pushing residents into pursuing an activity. Some staff understood the relationship and tried to encourage the residents to become involved in activities. Some of the staff did not pay attention to sleep disturbances and did not feel motivated to intervene in order to improve sleep (Flick et al., 2010). This highlights the importance of increasing knowledge among staff about the relationship between sleep and activity and asking the residents what activities they would prefer.

This thesis will hopefully contribute to increasing knowledge of factors associated with sleep disturbances and how to screen for insomnia. Furthermore, the limited evidence found in favour of non-pharmacological nursing interventions for sleep promotion should not impede but rather encourage future clinical research. Important steps in the future are to increase knowledge of sleep disturbances in undergraduate education and to increase the screening of sleep disturbances in clinical practice. Assessment using appropriate scales, diaries or objective measures needs to become a regular part of care plans. Considering the harmful effects interruptions in night sleep might have (Herzog et al., 2013), care interventions, such as turning, incontinence care or measuring vital signs, should be planned in such a way that the number of interruptions is minimised and the patient/resident has periods of at least 90 minutes of undisrupted sleep. Checks for light and noise levels during the night are part of this.

Further research

There is a need for further research and investigation into sleep promoting interventions. Non-pharmacological interventions should be investigated further with regard to their effects and a long-term perspective should be applied. Since gender differences are present in sleep disturbances it could be of importance to investigate further whether men and women should be approached differently when promoting sleep.

As far as we know, the significance of home maintenance for sleep, as found in Study III, has not been reported previously. Home maintenance possibly represents a higher construct. It is not the activity *per se* but what the activity represents that is of importance. In Study IV, the significance of being independently mobile and withdrawing to a private place were central. The findings in Studies III and IV could be two aspects of the same construct. This will need to be investigated further.

Social and physical activities have been investigated in relation to sleep promotion. In Study III, the socio-intellectual activity of playing chess/cards was found to be associated with fewer sleep disturbances. The effects on playing games should be investigated in more studies and also whether there is a difference in the effect on sleep between video games/computer games and face-to-face games.

Summary in Swedish/ Svensk sammanfattning

Vår sömn inverkar på förmågan att lära, memorera och andra kognitiva funktioner. Den inverkar också på fysiologiska funktioner som immunsystem och ämnesomsättning samt på välbefinnande och förmåga att kunna hantera dagliga stressorer. Ännu en aspekt av sömnen är att dess sammansättning förändras då vi åldras. Dessa naturliga förändringar leder till en mindre andel djupsömn och större andel ytlig sömn. Tillsammans med ett ökat antal nattliga uppvaknanden, då det kan ta tid att återgå till sömn igen, kan detta bidra till att sömnen uppfattas som mindre tillfredsställande. De naturliga sömnförändringarna kan dessutom förstärkas av sjuklighet, kulturella och sociala faktorer. En av de vanligast förekommande sömnstörningarna hos äldre är insomni. Insomni karaktäriseras av svårigheter att somna, nattliga uppvaknanden och att inte känna sig utvilad eller återhämtad på morgonen, vilket i sin tur ger konsekvenser på funktioner dagtid. Många gånger är insomnin kortvarig och försvinner efter några dagar. Men i vissa fall kan den kvarstå och då övergå i en långvarig form. Det är därför viktigt att vara observant på insomnisymtom för att i mesta mån förhindra att de övergår till en långvarig insomni.

Tidigare forskning har visat att i vårdmiljöer, som sjukhus eller äldreboenden, kan smärta, sjukdom, ångest, ljud eller omvårdnadshandlingar komma att förstärka de åldersrelaterade förändringarna i sömnen. Multisjuklighet och skörhet tillsammans med minskad fysisk aktivitet kan ytterligare försvåra möjligheterna till en god sömn. Då sömnstörningar ofta uppkommer i stressfyllda eller nya miljöer tillsammans med något sjukdomstillstånd, är det viktigt att sjuksköterskor är medvetna om de konsekvenser som sömnproblem kan ge. Det är därför betydelsefullt att ha redskap för att kunna utvärdera och bedöma sömnproblem samt att ha kännedom om åtgärder som kan göras för att förbättra sömnen. Sjuksköterskor har ett ansvar för att patienten får en god sömn, samtidigt visar aktuell forskning att dagens sjuksköterskor har begränsad kunskap om sömnens betydelse, hur den bedöms samt att användandet av icke-farmakologiska åtgärder för att förbättra sömnen är begränsat. Det kan därför vara svårt för sjuksköterskor att stötta och hjälpa personer med sömnproblem.

Det övergripande syftet för avhandlingen var att testa ett instrument för att bedöma insomni hos äldre personer, samt att undersöka insomni hos äldre utifrån associerade faktorer och evidens för icke-farmakologiska omvårdnadsåtgärder för sömnförbättring i vårdmiljöer. Syftena för studierna som ingår i denna avhandling utvecklades stegvis, beroende på fynden i föregående studier. Den första delstudien var en litteraturstudie där resultaten från nio publicerade vetenskapliga studier sammanställdes och funna omvårdnadsåtgärder värderades avseende evidens. Sex olika typer av omvårdnadsåtgärder identifierades genom studierna; stimulering av akupunkturpunkter, massage, aromaterapi, sömnhygien, lyssna på musik/naturljud eller se en instrumental musikvideo och avslappning. Resultatet visade att ringa till måttlig evidens finns de funna omvårdnadsåtgärderna. Enskilda studier kunde dock visa stora effekter på sömnkvalitet, insomningstid, total sovtid, sömneffektivitet och antal nattliga uppvaknanden. De inkluderade studierna var få, små och olika mätinstrument användes i studierna. Detta försvårade en överblick av omvårdnadsåtgärderna och deras effekt samt bidrog till att evidens för eller emot omvårdnadsåtgärderna var ringa/måttlig. Litteraturstudien väckte frågor om den stora variationen av mätinstrument för sömnproblem och vad för instrument som kunde lämpa sig för användning bland äldre personer. Tankarna ledde vidare till delstudie II, där egenskaperna hos ett screeninginstrument för insomni, the Minimal Insomnia Symptom Scale (MISS) testades.

Urvalet för både delstudie II och III hämtades från The Swedish National Study on Aging and Care – Blekinge (SNAC-B). Deltagarna i SNAC-B är personer 60 år eller äldre och boende i Karlskrona kommun. I delstudie II skedde datainsamlingen år 2008 och personer som deltagit i SNAC-B vid baslinjeundersökningen (år 2001-2003), kontaktades via brev. En enkät om sömnbesvär innehållande 25 frågor (USI-25) skickades ut till 886 personer och 548 personer besvarade enkäten. Tre av de ingående frågorna i USI-25 kan användas separat som ett screeninginstrument specifikt för insomni, då kallat för MISS. De tre frågorna tar upp insomningsproblem, nattliga uppvaknanden och problem med att inte känna sig utvilad på morgonen. Frågorna besvaras med inga, små, måttliga, stora eller mycket stora problem. En totalpoäng mellan 0 och 12 beräknas. En högre poäng innebär större problem. Resultatet visade att MISS hade god förmåga att identifiera äldre personer med insomni (sensitivitet 93 %) samt att skilja ut de som inte hade insomni (specificitet 84 %) vid ett gränsvärde av ≥ 7 poäng på instrumentet. Då testet är kort (tre frågor) och uppvisar god förmåga att skilja på personer med eller utan insomni, är det kliniskt användbart som ett grovt screeninginstrument för insomni hos äldre personer. Om en person antas ha insomni eller löper ökad risk för att utveckla insomni, bör sjuksköterskan vidta åtgärder. De omvårdnadsåtgärder som utvärderades i delstudie I, var alla introducerade och utförda av sjuksköterskor. Ett annat sätt skulle kunna vara att personen med sömnproblem var delaktig och själv utförde åtgärder för att förbättra sin sömn, exempelvis genom aktiviteter.

I delstudie III undersöktes därför associationer mellan fritidsaktiviteter och sömnproblem hos personer 60 år och äldre. Urval och data hämtades från den återundersökning i SNAC-B som genomfördes åren 2007-2009 och 945 personer inkluderades i studien. Sjutton olika fritidsaktiviteter undersöktes i förhållande till sömnproblem. Det kontrollerades också för ytterligare variabler såsom kön, ålder, funktionellt status, generell hälsa och sinnesstämning, vilka antogs kunna påverka förhållandet mellan fritidsaktiviteter och sömnproblem. Slutligen undersöktes också om aktiviteternas betydelse var olika för kvinnor och män. De fritidsaktiviteter som visade sig vara relaterade till mindre förekomst av sömnproblem var trädgårdsarbete, att ströva i skog och mark, reparation av bilar eller maskinell utrustning, reparationer i hemmet samt sällskapsspel som schack eller kortspel. Det vill säga, personer som utövade aktiviteterna hade lägre risk för sömnproblem. Kontrollerat för kön, ålder, funktionellt status, generell hälsa och sinnesstämning, kvarstod endast att spela schack eller kort som betydelsefullt för sömnen. Vidare visade resultatet att det föreligger skillnad mellan kvinnor och män avseende förekomst av sömnproblem, användande av sömnmedel och fritidsaktiviteternas betydelse för sömn. Aktiviteten att utföra reparationer i hemmet visade sig vara extra betydelsefull för kvinnors sömn.

I den fjärde delstudien valdes att fokusera på aktiviteter hos personer vid äldreboenden. Syftet för studien var att undersöka sömnvanor och dagliga aktiviteter vid äldreboende, samt att undersöka relationen mellan sömnvanor och dagliga aktiviteter. Data insamlades genom observationer (39 st.) och tio intervjuer vid tre äldreboenden under en sexmånadersperiod. Resultatet bestod av sex kategorier och ett övergripande tema, *"Avdelningens rytm är livets takt"*, som sammanband kategorierna med varandra. Det framkom att sömnen upplevdes god. De intervjuade personerna beskrev också olika strategier för att uppnå god sömn, som att justera tiden för sänggående eller att stiga upp ur sängen vid svårighet att somna. De boende uttryckte ett försiktigt missnöje med utbudet av aktiviteter, så till vida att fler aktiviteter önskades samt ökad möjlighet att kunna gå ut. Personer som kunde förflytta sig själva valde att tillbringa stor del av dagen i den egna lägenheten, där personen sysselsatte sig med olika egna aktiviteter. Fika och måltider ansågs skapa en rytm för dagen och gav skäl att gå ut till dagrummet. De bestämda tiderna underlättade reglerandet av tupplurar för de som tog sådana.

De personer som främst observerades ha svårt att delta vid aktiviteter och som sågs sova eller vara inaktiva en stor del av dagen var oftare intellektuellt nedsatta och hade större begränsningar i sin rörelseförmåga. En annan svårighet som påtalades av de boende var kommunikation. Många hade hörselnedsättningar vilket inverkar på förmågan att delta i samtal. Vikten av att personal fanns med och förtydligade vad andra sa, framhölls. Resultatet av delstudie IV kan innebära att bibehållandet av en viss grad av självständighet inverkar positivt på livssituationen och därmed påverkas

också sömnen positivt. De dagliga aktiviteterna ansågs av de boende spela roll för förmågan att sova. Resultatet tolkas dock som att det var möjligheten att välja aktivitet som främst bidrog till god sömn hos de intervjuade, inte aktiviteterna i sig.

Det sammantagna resultatet visar att omvårdnadsåtgärder som massage, stimulering av akupunkturpunkter, att lyssna på musik/naturljud eller se på en instrumental musikvideo, aromaterapi, avslappning samt sömnhygien hade ringa till måttlig evidens. Fritidsaktiviteter associerade till färre sömnproblem hos äldre, var trädgårdsarbete, reparationer av bilar och maskinell utrustning, reparationer i hemmet, spela schack eller kort samt att ströva i skog och mark. Aktiviteter med någon fysisk, social eller intellektuell komponent kan därför vara bra som egenvårdsåtgärder vid sömnproblem. Då hänsyn togs till ålder, kön, hälsa, funktionellt status och sinnestämning visade sig endast aktiviteten att spela schack/kort ha betydelse för sömn. Vid äldreboende framkom att förmågan att förflytta sig själv och ta initiativ till egna aktiviteter fanns hos de personer som ansåg sig nöjda med sin sömn. Vidare framkom att personer vid äldreboende önskade fler aktiviteter, att de sociala aktiviteterna som innefattade samtal kunde vara svåra och att möjligheten att gå ut var begränsad. Personer med begränsad rörlighet sågs till stor del sitta i dagrummen och de kunde inte alltid på ett aktivt sätt delta i de gemensamma aktiviteterna. Genom att skapa en vårdmiljö där de boende klarar mycket på egen hand kan därför vara gynnsamt för sömnen. Som personal inom äldreomsorg bör också särskild uppmärksamhet riktas till de personer som har begränsad rörlighet, för att undvika att de blir sittande ofrivilligt inaktiva i dagrummet. Slutligen visade delstudie II att MISS är ett användbart screeninginstrument för att bedöma insomni hos äldre. Då instrumentet är kort och poängräkningen enkel lämpar det sig väl för klinisk verksamhet, särskilt vid inskrivningssamtal och vid första mötet. Resultatet av denna avhandling öppnar upp för fortsatt och fördjupad forskning om vad som inverkar på äldre personers sömn och hur vi ska kunna ta tillvara kunskapen för att skapa förutsättningar för en bättre sömn. Det behövs fler studier som utvärderar effekterna av icke-farmakologiska åtgärder. Rutiner för att uppmärksamma, screena och intervensera mot sömnproblem behöver skapas och implementeras i klinisk verksamhet. Sjuksköterskor har en viktig roll att fylla i detta arbete då många av dessa uppgifter inryms i omvårdnadsansvaret.

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