DOCTORAL THESIS

Health intervention with weighted blankets for frail older people with insomnia in nursing homes

Eva Hjort Telhede

Halmstad University | School of Health and Welfare
Doctoral Thesis | Halmstad University Dissertations no. 113

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Weighted blanket made of water

"Om jag vill lyckas med att föra en människa mot ett bestämt mål måste jag först finna henne där hon är och börja just där. Den som inte kan det lurar sig själv när hon tror att hon kan hjälpa andra. För att hjälpa någon måste jag visserligen förstå mer än hon gör, men först och främst förstå det hon förstår.

Søren Kierkegaard

ABSCTRACT

Insomnia is a common health problem among frail older people in nursing homes. An alternative method of dealing with insomnia has been developed through weighted blankets. The overall aim was to explore and describe how older people with insomnia living in nursing homes are affected in terms of sleep, quality of life, ADL ability, nutritional status and medication after an intervention using a weighted blanket. The study uses a qualitative and quantitative approach to explore the experiences and outcomes of using the weighted blankets. It increases the opportunity to integrate different perspectives and methods to understand the weighted blanket sufficiently. Study I aimed to explore how frail older people insomnia living in nursing homes experience the use of a weighted blanket. Study II aimed to explore nursing staff's experiences of how a weighted blanket-based intervention influenced nursing home residents' self-rated health. Study III investigated the effects of weighted blankets on the health of older people nursing home residents in terms of QoL, sleep, nutrition, cognition, ADL, and medication needs. Study IV examined how weighted blankets affect the sleep patterns of frail older people living in nursing homes. The studies suggest that weighted blankets improve the sleep of frail older people living in nursing homes by reducing the number of times they wake during the night. They can also improve overall well-being, emotional state, cognitive function, nutritional status, and daytime activity levels. However, it is essential to consider individual differences, as some users may find the blankets uncomfortable. Study IV revealed that weighted blankets can improve the sleep and quality of life of older people nursing home residents. Their use constitutes a safe and non-pharmacological intervention, but more research is needed to explore the long-term effects.

Contents

ABBREVIATIONS

ADL	Activities of Daily Living
EQ-VAS	EuroQol Visual Analog Scale
MISS	Minimal Insomnia Symptom Scale
NREM	Non-rapid eye movement
PSG	Polysomnography
QoL AD	Quality of Life in Alzheimer's Disease
REM	Rapid eye movement
S-MMSE	Standardized Mini-Mental State Examination

ORIGINAL PAPERS

Study I

Hjort Telhede, E., Arvidsson, S., & Karlsson, S. (2024). Frail older people with insomnia experiences of using weighted blankets: a qualitative study. (Submitted in, *Health & Social Care in the Community*)

Study II

Hjort Telhede, E., Arvidsson, S., & Karlsson, S. (2022). Nursing staff's experiences of how weighted blankets influence residents in nursing homes expressions of health. *International Journal of Qualitative Studies on Health and Well-being, 17*(1), 1-13, doi.org/10.1080/17482631.2021.2009203

Study III

Hjort Telhede, E., Arvidsson, S., Karlsson, S., & Ivarsson, A. (2022). Weighted Blankets' Effect on the Health of Older People Living in Nursing Homes. *Geriatrics, 7*(4), 79. doi.org/10.3390/geriatrics7040079

Study IV

Hjort Telhede, E., Arvidsson, S., Ivarsson, A & Karlsson, S., (2024). The effect of weighted blanket on sleep in frail older people: A quasi-experimental study. (Submitted in, *Sleep Health Journal of the National Sleep Foundation*).

The papers are referred to in the text by their Roman numerals and have been reprinted with the permission of the respective publisher.

INTRODUCTION

The older population is growing, both in Sweden and globally. In 2019, 9% of the world's inhabitants were at least 65 years of age. This number is expected to increase to 16% by 2050; by that year, one in six people globally will be at least 65 years old or more (United Nations, 2019). In 2022, approximately 337,000 people in Sweden aged 65 and older (just over 3% of the total population) received social services and care. Of this number, 82,000 (about 24%) resided in nursing homes, where the average age was 85.6 years. The age group of individuals aged 95 years and older has also been growing in recent years (Swedish National Board of Health and Welfare, 2023). Many older people in the country rate their health as good, and such positive self-rated health is often linked to physical well-being, social engagement, independence, security, and enjoyment (Hjelle et al., 2017; Stephens et al., 2015). Older people living in nursing home are often frail. Frailty is a complex condition that leads to reduced strength and impacts multiple organ systems. It also entails risk factors for disability and death. Frail older people with multiple diseases and disabilities present challenges in organizing care and providing the best possible treatment (He et al., 2016).

Insomnia is a common health problem among frail older people. Many nursing home residents struggle to fall asleep and stay asleep, and often they do not wake up feeling rested. Anxiety and depression can accompany insomnia, and the three maladies are often interconnected. The relationship between these aspects can be complicated and make it difficult to maintain the well-being of older people in nursing home (Gulia & Kumar, 2018; Overbeek et al., 2018). Medications can also contribute to health problems. As people age, the risk of multimorbidity also increases. This causes the body to become more sensitive to medications, which can make it difficult to manage multiple health conditions that require treatment with numerous medications (O'Neill et al., 2020; Pitkala et al., 2015; Salzmann-Erikson et al., 2016; Zuidema et al., 2015). As older people age, various health concerns can

make it challenging to ensure they maintain a healthy lifestyle that helps them preserve good health. Non-pharmacological interventions can play a significant role in promoting the health of frail older people living in nursing homes. One possible nonpharmacological intervention is the use of weighted blankets. However, it is essential to conduct more research and gather evidence about the usefulness of weighted blankets as an intervention, especially among frail older people in nursing home. This dissertation focuses on the experiences of frail older people nursing home who underwent a health intervention involving the use of a weighted blanket.

BACKGROUND

Health

This dissertation probes the relationship between weighted blanket and the health of frail older people living in nursing homes. Defining the health of frail older people can be a complex process influenced by various factors (Louis & Rachel, 2019). Health is not merely the absence of disease or disability; it encompasses physical, mental, and social well-being, as well as the ability to cope with life's challenges. Health is influenced by various factors, including genetics, environment, lifestyle, and access to healthcare (Ruggeri et al., 2020). For frail older people living in nursing home, health entails maintaining well-being, relationships, inner balance, and peace while promoting independence, dignity, and quality of life in a safe and stimulating environment (Paque et al., 2017). The care provided to older people has long been permeated by an approach to healthcare that has its roots in the 18th century (Andreasson & Johansson, 2020). Since that era, care has often been based on a biomedical approach that emphasizes the treatment of injuries, diseases, and genetic disorders as the only obstacles to good health. As a result, the primary focus of this approach was on healing disease to promote general well-being. However, health is much more complex and can be understood in a broader scope that spans an individual's entire lifetime. The modern view of

health is that its preservation entails much more than merely treating illness. In order to fully evaluate a person's health, it is crucial to consider both subjective and objective aspects. Subjective health refers to how an individual rates their own health, whereas objective health highlights the measurable perspective (Andreasson & Johansson, 2020). The biopsychosocial model of health (which is increasingly replacing the biomedical model described above) emphasizes the importance of physiological, psychological, and social aspects in contributing to good health. This biopsychosocial model takes a more holistic approach and recognizes the connection between various factors in promotinge health and well-being. This, in turn, constitutes an expanded way of identifying the root causes of disease (Adler, 2009; Frazier, 2019). Frail older people who live in nursing homes have a high incidence of polypharmacy and medication-related problems, which reduce their quality of life (Díez et al., 2022). The psychological aspects quality of life can have significant negative and positive consequences for health. It is therefore essential to consider how everything is connected (Braveman et al., 2011; WHO, 2008). Understanding the complexity of health in frail older people with multiple medical conditions, those who are generally frail, those with unique life experiences, and individuals dealing with various forms of loss requires a broad model that explains and clarifies how all these aspects influence and interact with each other (Aguirre et al., 2022; Dyar et al., 2022). When considering human health, it is beneficial to apply a model that considers multiple aspects of a person's life. Older people have a wealth of life experience and a long history that can span many decades and vary significantly from person to person. A widely applied health theory is that of "Determinants of Health", which aims to reveal the underlying causes of illness and pinpoint what promotes health. This model is widely accepted (Dahlgren & Whitehead 1991). The Determinants of Health model was created as a tool by which to better understand and promote public health. It provides a comprehensive picture of aspects that affect human health. The model describes how an individual's health

can be affected by their circumstances of birth, upbringing, work environment, ageing, and the healthcare system in the country where they live. Various aspects (both past and present), including economics, social policy, and politics, have played a significant role in shaping the health of older people. The Determinants of Health model helps to understand a person's whole life. The core of the model is the individual and his or her character, together with the myriad of health elements that surround him or her (Aguirre et al., 2022; Dahlgren & Whitehead, 1991; Dyar et al., 2022). The Determinants of Health model has been criticized for its limitations; it is seen as overly simplistic and abstract. Several modifications based on the existing model have been made, for example, by adding determinants in the form of new digital technology or spiritual expressions and increased information speed (Dyar et al., 2022; Rice & Sara, 2019). The Östgöta model was developed by Jolanda van Vliet and Margareta Kristenson as part of the work of the Östgöta Commission for Equality in Health and is based on Dahlgren and Whitehead's Determinants of Health (Dyar et al., 2022; Östgöta Commission, 2014) (Figure 1). The updated, 2014 Östgöta model illustrates the complex relationship between society and individuals in determining health conditions. This model uses colour coding to show how structural and politically controlled social and environmental factors (marked in orange in Figure 1) can affect individual health-determining factors (marked in grey in Figure 1). The conditions for good health can be improved by creating equal opportunities at the regional, municipal, and local levels. This can be achieved by understanding the importance of an individual's belief in their abilities, trust in others, hope, and faith in the future. Nevertheless, certain factors beyond our control (such as genetics, gender, and age) can influence people's health from birth to death (Östgöta Commission, 2014). The Östgöta model can identify people at a higher risk of experiencing health problems, such as frail older people. Moreover, it emphasizes the adverse health consequences of mood, which include depression, lack of hope for the future, loneliness, and

having a limited social network. These circumstances are especially relevant for frail older people living in nursing homes (Donneyong et al., 2020; Hensley et al., 2018; Herman et al., 2015; Oates et al., 2020; Patel et al., 2016). Society must consider the complex interaction between the economic, ecological and social dimensions of sustainable development. The Östgöta model emphasizes how societal forces impact living conditions; for example, how the welfare system affects people's lives by providing social and care services (Dyar et al., 2022). The model highlights the social arenas in which people are raised, live,

work and die. It considers how people's living conditions vary on the basis of socioeconomics, gender, age and country of birth, as well as a result of their lifestyle, habits and behaviour. The model also has a "base" that urges the application of a view of humanity founded on the equal value of all people and on the principle of proportional universalism, a worldview that argues that everyone should be able to access different types of interventions, with different levels of intensities, based on their needs. With this standpoint as a starting point, the Östgöta model aims to facilitate a broad approach that encompasses health and lifestyle. The model recognizes the connection between various aspects of a person's life and how they can influence each other. It also acknowledges that the efforts that prove necessary to improve or preserve a person's health and well-being must take place at different levels within these different arenas. The Östgöta model can contribute to a deeper understanding of the challenges faced by frail older people when they move to a nursing home, as well as how their past experiences can affect their current situation (Östgöta Commission, 2014).

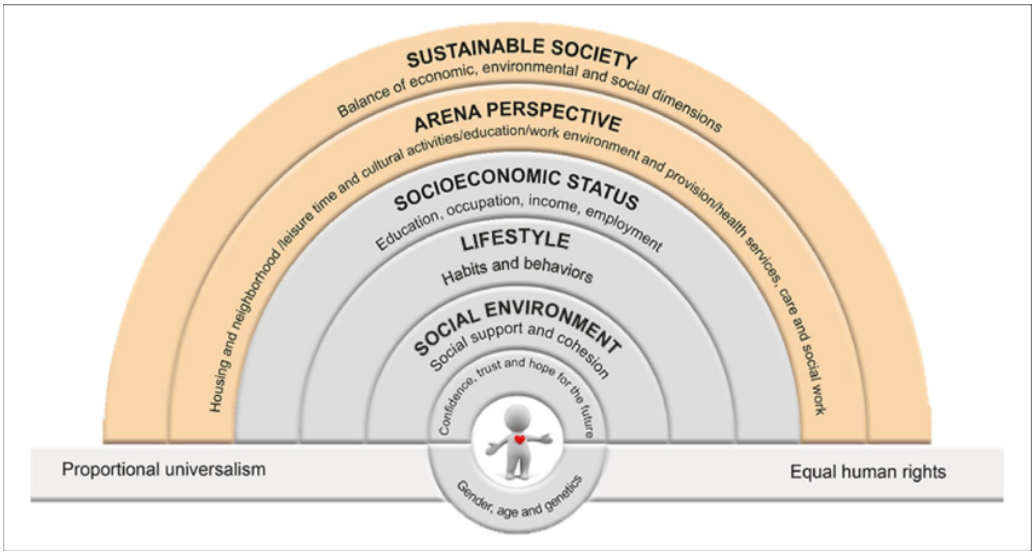

Figure 1. *The Östgöta model for equity in health – an interplay between individual, environment and society. Developed for the Östgöta Commission by Kristenson and van Vliet based on Dahlgren and Whitehead's 1991 "Determinants of Health" model.*

The base

The Östgöta model has a base that describes elemental approaches aimed at creating an equality perspective: proportional universalism and a view of humanity based on the equal value rights of all people (Östgöta Commission, 2014). Equal care should be provided to all individuals, regardless of background, to ensure equitable treatment (Whitehead & Dahlgren, 1991; WHO, 2008). This means providing support services for older people who need assistance. Assistance should be provided in various forms and levels of intensity, based on individual needs (Östgöta Commission, 2014). Support efforts should be customized to the requirements of frail older people or those who need care and attention. Proportional universalism aims to allocate resources, support efforts in a reasonable way, and tailor them to the needs of each frail older people, thereby ensuring that older people receive sufficient and

appropriate care, based on their unique conditions and needs (Ekman, 2014; Myndigheten för vårdanalys, 2013; Östgöta Commission, 2014).

The person

Based on the Östgöta model, the "person perspective" encompasses an individual's age, gender, genetics, self-confidence, trust, meaning in life, and hope. Represented in the model's innermost circle, this perspective is also affected by ageing. For although ageing is a natural part of life, the conditions and health of older people can be understood and theorized from various perspectives (Tang et al., 2019). The World Health Organization's criteria for good health (2020) in old age align with the Östgöta model's person perspective. They summarize essential prerequisites for health, such as the individual's physical abilities and cognitive functions, as well as her or his self-concept, self-confidence, trust, and satisfaction with life (WHO, 2020). It is essential to understand that the conditions of older people vary vastly, due in part to differences in life history and personality. At the same time, it is also essential to consider that age-related health changes can veer away from the younger generations perception of health (Jönson, 2016). The United Nations (UN) definition of older people categorizes them into two blocks: those between 65–79 years of age are termed "older person", and those over age 80 are the "oldest-old" (UN, 2019). The definition of an older person can also be divided into three periods of old age, in which the "youngest old" people are between 65 and 74 years old, "middle-old" people are between 75 and 84 years, and the "oldest-old" are those over 85 years old (Alperovitz & Mendelsohn, 2013) The conditions of senior citizens vary too widely to lump everyone over the age of 65 into the" frail older people" category. Indeed, the terminology must ideally recognize the significant generational differences within this group. There are varying personal differences even in this group of older people over 65 (Tang et al., 2019). The WHO (2015) explains that although ageing can result in a decline in specific abilities, there are no 'typical" older people, and their needs can

differ (WHO, 2015). Tthanks to adequate medical and socio-economic interventions, many older people continue to engage in active lifestyles that allow them to live longer and healthier lives (Abramson et al., 2016; Dehling & Rundgren, 2014). As time goes by, age-related problems accumulate. Still, it is important that older people maintain a sense of well-being and health. Nevertheless, the changes intrinsic to ageing can limit their lives and necessitate assistance in daily living, such as a move to a nursing home (Epps et al., 2018; Kalashyan, 2020; Pettersson et al., 2022; Zlatar et al., 2019). As age-related problems become more general, older people become frailer and more vulnerable to health problem. Frailty can be divided into four categories: clinical, physical as medical problems that can contribute to frailty, physical-functional are related to functional abilities and mobility, cognitive-psychological such as cognitive impairment, psychological issues and social factors such as social isolation, lack of support (Gorodeski et al., 2018). The term “frail describes older people who are at a greater risk of health problems due to the changes that often accompany ageing (Ekerstad et al., 2020). Older people who are considered frail and live in nursing homes face physical, psychological, and social challenges. These can reduce their ability to experience well-being and manage stress, thus increasing their risk of disability, institutionalization, and death (Satake & Arai, 2020).

As people age and move into nursing homes, they bring with them the unique personal characteristics and life experiences that contribute to their identities as individuals. However, with increasing age and frailty, maintaining these personal characteristics in a nursing home setting can present additional health challenges (Rekawatia et al., 2016). According to WHO (2020, p.1), the fundamental rights of healthy ageing include "the process of developing and maintaining functional capacities that enable well-being in old age." Optimizing "functional ability is the goal of the Decade of Healthy Aging" (WHO, 2020, p. 1). The Östgöta model is based on the principle of ensuring fair and equal care for everyone, regardless of personal

characteristics. However, due to their personalities or past experiences, some people may find it hard to entrust their care and treatment to a healthcare provider (Östgöta Commission, 2014). This lack of confidence in the healthcare system can increase the risk that they fail to seek necessary help or treatment that may not be optimal for the preservation of their rights as individuals. Suspicion of healthcare professionals can hinder those that need help from obtaining it (LoCurto & Berg, 2016; WHO, 2008). When older people move into a nursing home, it is essential to understand how their personal characteristics from earlier in life and the consequences of increased frailty, illness, and ageing affect their personality as individuals. It is essential to preserve their remaining resources and ensure they feel socially connected and safe (Scheibl et al., 2019; Sussman & Dupuis, 2014; Wu & Rong, 2020). Unfortunately, older people who identifies as frail may be at a higher risk for health problems (Warmoth et al., 2015). Identifying oneself as frail can also inspire negative thoughts, e.g., regarding self-worth. Depending on how frail older people see themselves, coping with age-related changes can be challenging (Dyar et al., 2022). Negative emotions can also affect trust and hope for the future, which are essential factors in determining general health, according to the Östgöta model (Östgöta Commission, 2014).

Social environment

The second circle of the Östergöta model represents the individual's social environment, including social cohesion, social support, and social networks. It refers to how well a person is integrated into their social context and how many friends and acquaintances can provide practical help, fellowship, and emotional support (Östgöta Commission, 2014). As the population ages, society must provide more significant social resources and support to older people who have lost their previous social support and networks (Lundgren, 2018). Many of the frail older people who move into nursing homes have experienced major changes in their social networks, often as a result of disease rather than any other character trait. This often

detracts from their sense of individuality (Li et al., 2020; The National Board of Health and Welfare, 2021). Social beliefs about the role of older people in society based on preconceptions and stereotypes can prevent them from being included in social networks. They may feel excluded from participating in society because others see them as no longer contributing citizens, especially after moving into nursing homes (Kwong & Yan, 2021). As they age, people experience various changes, some of which may significantly impact their lives. These changes may be due to social factors (such as the loss of a spouse) that can make it necessary for them to move from their home to a nursing home. This adjustment can be challenging, as it requires older people to adapt to new routines and habits. Health and lifestyle changes also go hand-in-hand with ageing; here, it is crucial to provide social support in different forms than before (Ernsth & Östlund, 2020; Suvanto, 2018; Östgöta Commission, 2014). Social isolation, reduced social cohesion, and shrinking social networks can significantly affect the general health of frail older people. Unfortunately, altered social cohesion can lead to depression and cognitive decline. These conditions can ultimately result in physical weakness (Bunt et al., 2017; Ma et al., 2018; Makizako et al., 2015). Even if life changes for frail older people, it is essential that they retain a social context, social network, and support that empowers them to be seen and heard as participants in their society. Such participation constitutes a fundamental protective factor for health. Social support is central to self-rated health and psychological well-being, but also protects against illness, e.g., heart attack and early death (Berkman, 2004; Östgöta Commission, 2014)

Lifestyle

A healthy lifestyle involves a nutritious diet and engaging in regular physical activity and is widely recognized as beneficial for health. Nonetheless, if these habits are not properly maintained, they can become risk factors and result in common health problems, such as heart disease, stroke, or diabetes (Östgöta Commission, 2014). Aspects that benefit overall quality

of life and health include physical abilities, cognitive function, general well-being, strong self-concept, and satisfaction (WHO, 2020). As people age, their general health tends to decline, which affects their habits and lifestyle. This is especially true for those aged 80 and over. Due to their health conditions, less than half of this group can maintain their former usual lifestyle. In addition, older people may experience reduced activity capacity, a change that usually becomes noticeable around age 80 (SBU, 2022). They may also have cognitive impairments that make it difficult to remember certain circumstances or express themselves. Difficult concentrating and communicating can result in reduced social interaction. Such interaction is a prerequisite for maintaining a healthy lifestyle (Fakoya et al., 2020). In addition, many frail older people may experience impaired hearing, vision, and mobility, as well as increased fatigue. This, in turn, leads to a change in their daily activities. Their physical changes and increased frailty often lead them to move to nursing homes, further limiting the possibility to maintain their former lifestyle (Dahlberg et al., 2022; Fakoya et al., 2020; Satake & Arai, 2020). Furthermore, losing a partner late in life means losing intimacy, lifestyle, and habits (Dahlberg et al., 2015; Grover, 2022). Frail older people should be given access to social activities and supportive resources that help them maintain their lifestyle and habits. Nursing homes must create an atmosphere that preserves the habits and routines of frail older people (Dyar et al., 2022; National Board of Health and Welfare, 2020; Östgöta Commission, 2014). Regardless of whether they reside in a nursing home, past and present lifestyle habits influence the health of older people (SBU, 2022).

Socioeconomic status

The socioeconomic status focuses on education level and occupation. Jobs with low socioeconomic status, such as those without vocational education requirements, have been linked to various health issues, including heart attacks, depression, and burnout (Östgöta Commission, 2014). The life situation of frail older people varies according to their

socioeconomics, occupation, education, and income. Among older Swedes, there is a higher level of education among the younger age group (<60 years) than the older age group (>60 years). Women under the age of 80 are most likely to have attended upper secondary school, while older female adults are more likely to have discontinued their education before secondary school. For men, an upper secondary education is most common at ages 77 and over, while older people are more likely to have ended their studies at a pre-secondary level (SBU, 2020). Compared to the rest of the Nordic countries, Sweden has a higher proportion of pensioners with a relatively low financial standard, but it is on par with the average for the EU (Swedish Pensions Agency, 2018;2022). Women, single individuals, and those over age 65 are at a higher risk of falling below the income threshold for a modest financial standard. This is mainly due to low-income-based pensions. Although present-day Sweden has a more advanced pension system compared to its historical origins, a report from the Swedish Pensions Agency (2022) shows that 1.3% of people aged 65 and over live in abject poverty. By comparison, 13% of Sweden's senior citizens are considered relatively poor (Swedish Pensions Agency, 2018; 2022). People with low socioeconomic status, limited education, and low income, as well as those over the age of 80, are at a greater risk of experiencing ill health. Furthermore, social heritage" suggests that older people whose parents had limited access to education may also face challenges in attaining higher education (Fakoya et al., 2020; Östgöta Commission, 2014).

Arena perspective

The arena perspective includes the various social arenas in which people are raised, live, work, and die (Östgöta Commission, 2014). In this perspective, the Östgöta model thus highlights the past and present life arenas of frail older people, as well as how ageing affects them (Moen, 2001; Öberg, 1997; Öberg, 2016; Östgöta Commission, 2014). Frail older people who experience changes to their arenas, such as a move to a nursing home, often

experience other associated changesand losses of arenas, both social and physical (Moen, 2001; Öberg, 1997; Öberg, 2016; Östgöta Commission, 2014)..Arenas of community support include various health and social services available in different settings, such as the individual's home, hospice, and nursing home (European Commission, 2019). According to the WHO (WHO, 2020), communities must have arenas that support older people' fundamental human right to be able to maintain their health and function. This societal support should also entail an understanding that older people are not homogeneous (Suvanto, 2018). In Sweden, nursing homes are a form of accommodation for older people who need support. According to the Swedish Association of Local Authorities and Regions (SKR 2023), municipalities have an obligation to accommodate frail older people who need assistance. Nursing homes are unique arenas, because they constitute both someone's home and a caring environment for nursing staff (SKR, 2023). The nursing staff is a crucial resource in assisting frail older people with tasks such as dressing, eating, and personal hygiene (Eckerblad et al., 2015; Sarvimäki & Stenbock-Hult, 2014).

The Östgöta model's arena perspective can help comprehend the complex intersection between the workplace and living environments, particularly in the context of frail older people who transition from their homes to nursing homes and rely on nursing staff for daily assistance (Beck et al., 2012; Swedish National Board of Health and Welfare, 2006). The arena perspective should be understood based on previous life and current circumstances. (Dyar et al., 2022; Östgöta Commission, 2014).

Sustainable society

The Östgöta model aims to create a sustainable society that takes into account economic, ecological, and social dimensions. It considers the structural and political factors that affect individual health determinants (Östgöta Commission, 2014). Sweden strongly emphasizes equal care and treatment for everyone, regardless of background or age (Swedish National

Board of Health and Welfare, 2020). Sweden's welfare system provides tax-subsidized and tax-funded services to ensure the security of the individual. Among these are services targeting childhood, illness, unemployment, disability, and old age, e.g., nursing home care (SOU 2000:38). The sustainable society in the outermost circle of the Östergöta model is structured and politically controlled and plays a significant role in how older people live, e.g., in a nursing home. Care and support services are essential to ensure that frail older people receive social support, especially towards the end of their lives. Correct planning and management are essential (Dyar et al., 2022; Hellström et al., 2014; Overbeek et al., 2017; Östgöta Commission, 2014). Many older people who need nursing home-based help rely on well-planned policies and care to ensure their health and well-being (Dyar et al., 2022; Overbeek et al., 2017; Östgöta Commission, 2014). Not all frail older people in nursing homes feel safe or trust the care provided, often due to their life history and lack of confidence in societal systems (Cho et al., 2017; Donnelly & MacEntee, 2016). When trust is lacking, it is less likely that an individual will seek help or care when they need it. This applies especially to people who have experienced vulnerable social situations, have small social networks, or are afraid and depressed (Östgöta Commission, 2014).

Sleep

Sleep is essential for maintaining physical and mental well-being in humans and animals. It can be measured in various terms, such as total sleep time, sleep onset latency wake after sleep onset, sleep efficiency sleep quality, and daytime sleepiness. These concepts are often used in sleep assessment (Floyd et al., 2007; Li et al., 2018; Ohayon et al., 2004). During sleep, the brain transitions from an active state to a disconnected one, allowing it to rest and recover from wakefulness. To maintain good health, it is recommended that adults sleep for an average of 7-9 hours a day, although individual needs may vary. In keeping with this recommendation, adults typically sleep about eight hours each night. This means that humans

spend approximately one-third of their lives sleeping (Benedict & Tunberg, 2018; Tononi & Cirell, 2013).

Melatonin is a circadian hormone produced at night by the pineal gland, regulated by the light/dark cycle. Melatonin is essential for regulating sleep cycles and is secreted in response to darkness. When light hits the eye, signals are sent to the hypothalamus, signaling the pineal gland to stop secreting melatonin. Conversely, as daylight decreases in the evening, melatonin secretion increases and signals the body to prepare for sleep (Foster, 2020; Pereira, et al. 2020). Brain cells are very active during waking hours, and their activity can be measured using electroencephalography (EEG). Sleep usually begins with a sensation of drowsiness, followed by entrance into the non-rapid eye movement (NREM) stage. NREM sleep is divided into three substages: Stage N1, Stage N2 and Stage N3. Older literature describes four stages of NREM sleep, but in the current model, NREM Stage 4 now comprises a latter step in Stage N3. Stage N1 is the sleep stage in which the transition from wakefulness to sleep occurs (Benedict & Tunberg, 2018; Foster, 2020; Memar et al., 2018). During Stage N1, eye movements become slow and rolling. This is the lightest stage of sleep. When a person starts to feel tired, their brain waves slow down and decrease in size. In an EEG, further reductions in brain wave activity are showns when the transition from drowsiness to Stage N1 occurs. A person who awakens from Stage N1 may not even realize that they had been asleep. N1 sleep typically accounts for 5–10% or less of an adult's sleep time. Stage N2 is the second stage of light sleep, and adults typically reach it after about 5 minutes. This stage lasts about 50–60% of total sleep time. In Stage N2, two types of brain activity occur: slow brain waves and sleep spindles, i.e., short bursts of high-speed rhythmic brain waves that travel from the thalamus to the cerebral cortex. The thalamus is an area of the brain that influences our consciousness (Benedict & Tunberg, 2018; Foster, 2020; Memar et al., 2018). All sensory information must pass through the thalamus to the cerebral cortex, where it is processed. Sleep spindles create

the conditions for memory, especially procedural memory, because they are located in areas important for motor skills. Growing children have more sleep spindles, while older people have fewer, usually due to the reduced mental activity of many older people (Schönauer & Pöhlchen, 2018). More sleep cycles also lead to fewer awakenings during the night. Deep sleep, also known as Stage N3 sleep, makes up about 10–20% of total sleep time for young to middle-aged adults. This stage of sleep becomes less frequent as we age. During Stage N3, the brain and body experience their most profound recovery phase and the stress hormone cortisol reaches its lowest levels. An EEG scan conducted during this stage will show slow, low brain waves. Stage N3 is more prominent in the first half of the night, and it is more challenging to wake someone this stage than from N1 and N2 sleep (Benedict & Tunberg, 2018; Foster, 2020: Walker, 2018). During rapid eye movement (REM) or "dream sleep", a person often experiences dreams. Movement under the eyelid may indicate that this phase has been entered. Dream sleep helps individuals process emotional experiences from their day. In this phase, cortisol levels, blood pressure, and activity in certain parts of the brain increase. REM sleep is associated with vivid dreams. Memories of experiences from the past day are partially activated, and some memories from the past may resurface. People typically sleep through the NREM and REM sleep phases, which come in cycles (Benedict & Tunberg, 2018; Foster, 2020: Walker, 2018). During a cycle, sleep vacillates between the different phases, and an adult normally experiences these phases 4-6 times per night. Although the length of each cycle can vary, they generally last around 90 minutes. The body's natural circadian rhythm controls vital functions like waking up and sleeping and works on a 24-hour cycle. The suprachiasmatic nucleus in the brain regulates this process (Benedict & Tunberg, 2018; Rosenwasser & Turek, 2015; Siegel et al., 2009; Walker, 2018). Getting enough sleep is essential for recharging energy and maintaining good mental health. The circadian rhythm regulates when a person is awake and asleep and is thus essential to maintaining a balance

between these two states. People with a balanced circadian rhythm can feel their best and function optimally throughout the day (Pulak & Jensen, 2016). The body's many functions are influenced in different ways by its natural daily cycle. The immune system is more active in the late evening and early morning. Blood pressure, heart rate, and body temperature reach their highest levels during the day. Lung function is best in the afternoon and weakest twelve hours later. The stress hormone cortisol rises 20-30 minutes before waking up and remains elevated until nearly midnight, when it starts to drop. Heart rate is highest at noon and decreases towards the evening, along with blood pressure (Benedict & Tunberg, 2018; Foster, 2020; Walker, 2018).

Insomnia

Difficulty falling asleep and staying asleep is the main symptom of insomnia. Insomnia find that they can no longer fall asleep naturally. Waking up after only a short period of sleep is also typical. As a rule, people with insomnia have trouble getting back to sleep (Crönlein & Spiegelhalder, 2019). Regardless of age or background, everyone needs an uninterrupted "good night's sleep". Insomnia is more common among women, those over the age of 65, and people with certain personality traits (like a tendency to worry, perfectionism, or neuroticism). It can also be caused by other mental health issues, such as depression, anxiety, or post-traumatic stress disorder (Bollu & Kaur, 2019). Insomnia can lead to problems during the day, among them decreased productivity, more accidents, trouble concentrating, and a lower quality of life. Stress can worsen insomnia by raising cortisol levels, making it harder for the brain to relax and enter deep sleep. Sleep deprivation can also cause anxiety, worry, and irregular brain activity. Medical or mental health conditions can cause insomnia, as can certain medications or substances, environmental factors (like worrying about sleep), or other biological factors, such as chronic pain or breathing problems (Stanford Medicine, 2023). The daytime condition of insomnia is affected by their lack of sleep. Typical effects include

concentration disorders and feelings of tiredness or exhaustion. The muscles of the body also become more tense, making it impossible to relax. Hyperarousal, one of the essential pathophysiological symptoms of insomnia, also manifests during the day (Dressle, & Riemann, 2023; Riemann et al., 2022). Hyperarousal is a term used to describe the physiological phenomena that arise from chronic insomnia. In this state, there is an increase in autonomic activity in the nervous system, which can lead to exaggerated mental excitement, uncontrollable fear reactions, and an inability to relax despite fatigue (Dressle, & Riemann, 2023; Riemann et al., 2022).

Professor and psychologist Arthur Spielman developed a treatment plan for patients with insomnia by conceptualizing the assessment of insomnia diagnostics. According to Spielman's so-called "3P" model, insomnia results from three primary factors: predisposing, precipitating, and perpetuating. The first two factors (predisposing and precipitating) reflect the background for understanding insomnia. The third factor (perpetuating) emphasizes the role of behavioural considerations in prolonging the condition. In the 1980s, hypnotic medications were commonly used to treat various sleep problems (Spielman et al., 1987a; Spielman et al., 1987b). Spielman's research resulted in the development of sleep restriction, one of the most effective methods for improving sleep quality. This treatment method aims to treat the body's fatigue by increasing the amount of deep sleep a person gets.

As people age, their sleep patterns shift (Chaput et al., 2020; Gulia & Kumar, 2018). While these changes are to be expected, it is essential for the health and well-being of older people to get acceptable and good quality sleep (Rodriguez et al., 2015; Suzuki et al., 2017). Insomnia and sleepiness during the day are the most prevalent sleep disturbances among older people. Approximately 15–45% of people in this demographic have trouble falling asleep, while 20–65% frequently wake up in the middle of the night and struggle to get back to sleep (Praharaj et al., 2018). Insomnia is more common among frail older people living in nursing homes and rural areas (El-Gilany et al., 2017). To better understand sleep changes in older people, the 3P model addresses the complexities of the issue from multiple perspectives.

Figure 2. The Spielman's 3 P model. The x-axis represents time and the y-axis represents the propensity toward disease manifestation. Reuse/adapted from Spielman, A. J., Caruso, L. S., & Glovinsky, P. B. (1987). A behavioral perspective on insomnia treatment. The Psychiatric Clinics of North America, 10, 541–555. [Copyright 1987 with permission from Elsevier]

Predisposing factors

Predisposing factors beyond a person's control can increase the likelihood of developing insomnia (Perlis et al., 2011; Spielman et al., 1997a; Spielman et al., 1997b). Just as some individuals have a genetic predisposition to heart disease or cancer, certain factors may predispose people to insomnia. Genetic or personality-based vulnerabilities, including personality traits like depression, stress, worry, hyperarousal, or anxiety, can cause an intense reaction to stressful circumstances, predisposing a person to insomnia (Spielman et al., 1997a; Spielman et al., 1997b). Predisposing factors are the initial risks that can contribute to insomnia. Frail older people have several predisposing factors for insomnia. Genetics and personality traits can increase their vulnerability, and additional medical conditions and medications can also contribute (Praharaj et al., 2018; Yuan et al., 2020). Older people tend to experience less anxiety than younger people. This could be due to their positive outlook on life and reduced emotional instability. However, it is essential to note that it may not be accurate to rely on these estimates, as detecting depression and anxiety in frail older people can prove challenging. Members of this demographic group expect to feel "down" as they age and may not see the need for treatment. They may also describe physical symptoms such as fatigue, sleep problems, and psychomotor issues as their primary concern, but these can contribute to insomnia (Lutz et al., 2020). In older people, new anxiety disorders rarely emerge as a new problem. Almost 99% of those aged 65 and above who suffer from anxiety have previously had an anxiety disorder. Persistent anxiety may be indicated by a poor perceived quality of life, along with other depressive moods or personality traits. Medication

and a negative outlook on life can also constitute predisposing factors for insomnia (Creighton et al., 2017; Mackenzie et al., 2014). In addition to personality, other genetic factors may play a role. People who experience an elevated body temperature during sleep are more susceptible to developing insomnia (Ellis et al., 2021; Perlis Spielman et al., 1987a; Spielman et al., 1987b; Spielman et al. et al., 2021; et al., 2000). They also are prone to predisposing factors such as biological peculiarities and changes in sleep patterns, which lead to circadian rhythm disturbances. The circadian rhythm – the body's internal clock that regulates the sleep-wake cycle –, tends to change with age. Older people have fewer sleep cycles, and they experience less total sleep time, less efficient sleep, and less deep sleep (slow wave sleep). They often find that they naturally wake up early and feel sleepy earlier in the evening. With age, the amount of Stage N1 and Stage N2 sleep increases, while REM sleep decreases (Mattis & Sehgal, 2016; Pótári et al., 2017). Sleep becomes more fragmented and less restorative, another predisposing factor for insomnia. In addition, older people have more extended periods of wakefulness after falling asleep (WASO). Communication in the cerebral cortex is affected by age, and this may contribute to these changes (Chaput et al., 2020; Gulia & Kumar, 2018; Li et al., 2018). Frail older people also experience changes in melatonin production. This is yet another predisposing factor that can affect their ability to fall asleep and stay asleep (Chaput et al., 2020; Gulia & Kumar, 2018; Li et al., 2018).

Precipitating factors

Stressful circumstances can precipitate insomnia (Perlis et al., 2011; Spielman et al., 1997a; Spielman et al., 1997b). Stressful circumstances can be caused by traumatic life events such as death, as well as stressful situations like relationship problems, job loss, starting a new job, becoming a parent, moving to a new place, illness, social loss, pain, and shift work. Other factors, among them noise disturbances, temperature changes, and lifestyle risk factors (e.g., consuming coffee, black tea, and alcohol) can also contribute to insomnia. As people age,

they may find that external factors such as noise, light, or discomfort more easily disturb their sleep, and they may also become more sensitive to changes in their sleep environment. These factors precipitate insomnia (Chaput et al., 2020; Gulia & Kumar, 2018; Satake & Arai, 2020) Precipitating insomnia in frail older people often involves medical conditions, such as cardiovascular and neurodegenerative conditions, as well as general life stress (Ellis et al., 2021). Medical and psychiatric conditions, but also medications act as precipitating factors such as antidepressants, diuretics, beta blockers and benzodiazepines (Ellis et al., 2021; Li et al., 2018).Many frail older people with neurodegenerative diseases such as Alzheimer's disease, Parkinson's disease and Huntingtons disease experience disturbances in their sleep and circadian rhythms. Cognitive impairment often leads to insomnia. However, it is uncertain whether it is the neurodegenerative disease itself that causes these disturbances, (e.g., insomnia), or whether, conversely, the disturbances in sleep and circadian rhythm contribute to the development of neurodegeneration (Mattis & Sehgal, 2016). The extent of an individual's vulnerability determines the degree to which a precipitating factor causes insomnia. Even missing a few nights of sleep can lead to more sleepless nights, resulting in a cycle of lost sleep that can continue until clinical insomnia develops (Ellis et al., 2021; Spielman et al., 1987a; Spielman et al., 1987b). Precipitating factors often become more apparent when frail older people move to nursing homes (Satake & Arai, 2020). Moreover, physical activity is often reduced in nursing homes, leading to a passive lifestyle that can worsen insomnia, especially in combination with natural ageing (Chaput et al., 2020; Gulia & Kumar, 2018). Other precipitating factors for insomnia are related to impaired physical ability. These include impaired hearing, vision, and mobility, along with social, psychological, and physical losses (Dahlberg et al., 2022; Eckerblad et al., 2015; Fakoya et al., 2020).

Perpetuating factors

Perpetuating factors are phenomena that maintain the insomnia disorder itself and are a common target for non-pharmacological therapies among them conditioned insomnia and learned insomnia (Ebben & Spielman, 2009; Spielman et al., 1997a; Spielman et al., 1997b). These perpetuating factors may exacerbate already poor sleep. Inappropriate coping behaviours for dealing with insomnia may include the use of perceived sleep aids, such as excessive alcohol consumption, watching TV, or using a mobile phone in bed. Younger people also rate their sleep quality lower than older people. One explanation for this is that older people have lower expectations of the quality of their sleep. The anticipation that sleep will be poor can act as a perpetuating factor. Older people thus anticipate that their sleep will change and grow worse as they age (Gooneratne & Vitello, 2014). Perpetuating factors may include changes in daily routines due to fatigue from lack of sleep. These changes, in turn, lead to reduced physical activity. Previously regular social and physical activities that positively affected sleep may be eliminated or change with ageing. When daytime activity decreases and sleep at night becomes worse, many frail older people take naps during the day. Daily naps may act as perpetuating factors and make it more difficult to fall asleep at night (Furihata et al., 2016). This can perpetuate insomnia, which in turn can lead to other health problems. Moreover, insomnia and other problems may perpetuate symptoms of depression and anxiety, further exacerbating insomnia and worries tied to the ailment (Chang et al., 2014; Horwath & Szczerbińska, 2017; Junghong et al., 2017; Kume et al., 2016). Repeated yet unsuccessful efforts to sleep can thus lead to counterproductive compensatory behaviour. Insomnia can lead people to cancel scheduled daytime commitments, and this constitutes yet another perpetuating factor. However, misconceptions about the quality and quantity of sleep can also lead to increased sleep-related anxiety. Dysfunctional beliefs about sleep, such as the misconception that experiencing a few brief awakenings during the night abnormal, may also

contribute to insomnia by making people more afraid they will develop the condition (Ellis et al., 2021; Spielman et al., 1987a;1987b). If this problem becomes long-lasting, it becomes a perpetuating factor. When predisposing factors disrupt a person's sleep, they may develop habits that initially help them to cope but ultimately lead to an unsynchronized sleep schedule and disruption of their circadian rhythm. However, this compensation for missed sleep can lead to a discrepancy between a person's sleep opportunity and ability, perpetuating poor sleep habits. Spielman's 3P model provides a framework for understanding why people experience insomnia and continue to suffer from it even after addressing typical stressors (Ebben & Spielman, 2009; Spielman et al., 1987a;1987b). (Figure 2)

Treatment of insomnia in frail older people

Frail older people with insomnia turn to medications like benzodiazepines for treatment. While these drugs are commonly prescribed to manage sleep disorders and anxiety, they come with potential adverse effects, including the risk of addiction. Prolonged use of benzodiazepines can also damage cognitive function and increase the likelihood of developing Alzheimer's disease (Ettcheto et al., 2020; de Gage et al., 2014; Yaffe & Boustani, 2014;). Long-term use of various medications can result in depression and, in the worst case, lead to side-effects including both memory loss and sleep disorders. Hazardous medications such as benzodiazepines and so-called "Z-drugs" are widely prescribed in medical practice because of their anxiolytic, hypnotic, and muscle relaxant properties. Z-drugs include zolpidem, zopiclone, and zaleplon. Examples of benzodiazepines are diazepam, lorazepam, oxazepam and nitrazepam (Ettcheto et al, 2020; Praharaj et al., 2018; Skottheim et al., 2018). No matter the age of the insomniac, treatment with medication is common practice. Medication can also

be a contributing factor to insomnia in older people. These medications are only intended for short-term use, but ageing can cause long-term or permanent changes to older people' sleep patterns, and so despite this, many are treated with medication for extended periods (Hellström et al., 2014; Kume et al., 2016; Rawtaer et al., 2017). For this reason, and to avoid medical side effects, non-pharmacological treatment should primarily be chosen for the treatment of frail older people, and medications should be prescribed with caution. It is essential to provide older people with non-pharmacological solutions for better sleep, and such interventions are available and useable by this population. These treatments include behavioural interventions such as cognitive behavioural therapy (CBT), sleep hygiene, and relaxation techniques (Sun et al., 2013). Aromatherapy with lavender oil has also proven effective (Moghadam, 2021), as has spending time outdoors in natural daylight (Düzgün et al., 2017). These interventions have been shown to promote better sleep and improve sleep quality for older people. It is crucial to use non-pharmacological solutions that avoid medical side effects and use pharmacological treatment cautiously (Düzgün et al., 2017; Moghadam et al., 2021; Sun et al., 2013).

Weighted blankets

One non-pharmacological intervention is the use of weighted blankets, which differ from regular blankets made entirely of fabric. The inside of a weighted blanket is lined with a heavy material of some kind, usually tiny glass, plastic, or metal spheres or natural fillers such as rice, grain, beans, or sand (Eron et al., 2020). These materials are sewn into pockets or channels and arranged to distribute the weight evenly throughout the blanket. When a person lies under a weighted blanket, they experience a sensation of gentle pressure distributed evenly over the entire body. The function of a weighted blanket is that the weight helps stimulate the body tactilely through the resulting deep pressure. Deep pressure can be experienced as a touch or hug and is thus considered a non-pharmacological intervention for

treating sleep and anxiety issues (Champagne et al., 2015; Eron et al., 2020; Gee et al., 2016). In this context, the use of pressure results in what is known as Deep Pressure Stimulation (DPS). DPS creates a sensory modulation via the central nervous system, which controls involuntary processes such as heart rate, blood pressure, and breathing. DPS can also inhibit impulses to the central nervous system's stress response, improve sleep, provide warmth, increase body awareness, reduce anxiety, and lower blood pressure and heart rate (Hvolby & Bilenberg, 2011; Mullen et al., 2008). The theory behind the use of weighted blankets combines DPS with another phenomenon known as Sensory Integration (SI) (Eron et al., 2020). The idea behind SI was originated by Jean Ayre (1920-1988), an American occupational therapist who explained the connection between brain activity and behavioural outcomes. Although rooted in neurology and nervous system functions, the theory can be challenging to understand (Bundy & Lane, 2020). Through the crucial component of deep pressure, DPS and SI facilitate relaxation, reduces anxiety, and promotes faster recovery where the deep pressure treatment is a crucial component (Ackerley et al., 2015; Hvolby & Bilenberg, 2011).

Weighted blankets can be helpful to individuals with sensory disorders, particularly children and young people. However, their use has been observed to have potential benefits for people of all ages, including adults with insomnia and depression. Studies show that using a weighted blanket can facilitate the onset of sleep, lead to fewer nocturnal awakenings, increase feelings of calm, and reduce anxiety (Ackerley et al., 2015; Eron et al., 2020; Larsson et al., 2021; Pekçetin et al., 2016). The accepted guideline for weighted blankets is to choose a product that weighs no more than ~10–12% of the user's total body weight (Ackerley et al., 2015; Eron et al., 2020; Larsson et al., 2021; Pekçetin et al., 2016).

Not everyone should use a weighted blanket. This applies especially to people who cannot remove it independently, such as young children (Ackerley et al., 2015; Case et al., 2021;

Mullen et al., 2008). Moreover, people with certain medical conditions, such as respiratory or circulatory problems, may find them unsuitable (Chen et al., 2016; Eron et al., 2020; Pekçetin et al., 2016). Everyone senses deep pressure differently, and the sensation can be pleasant or unpleasant, depending on how it is accepted (Hjort Telhede et al, 2022b; Jung et al., 2021).). The use of a weighted blanket has resulted in higher levels of melatonin and oxytocin among users, compared to the use of a regular blanket. Oxytocin has multiple biological effects. It reduces fear, pain, and stress and increases well-being, calmness, and melatonin levels, thereby stimulating sleep (Meth et al., 2022). The usefulness of using weighted blankets to improve activity levels has shown mixed results in research. Initial studies did not find any improvement in activity levels. However, subsequent research suggests that using a weighted blanket for extended periods can improve activity levels (Hvolby & Bilenberg, 2011; Hvolby.,2020). Using a weighted blanket also helped children with ADHD manage their everyday activities. Furthermore, weighted blankets have been shown to improve blood pressure and heart rate (Champagne et al., 2015; Larsson et al., 2021; Mullen et al., 2008).

Integration of the theoretical frameworks

ntegrating the Östgöta model for equal health (Östgöta Commission, 2014), Spielman's 3P model for insomnia (Spielman et al., 1987a;1987b), and the theory behind the use of weighted blankets to elicit SI and DPS (Champagne et al., 2015; Eron et al., 2020; Gee et al., 2016) yields a comprehensive and complementary understanding of the underlying causes of insomnia in older people nursing home residents. An integration of these three approaches also explains how insomnia can be prevented and alleviated. The Östgöta model focuses on the political and social factors connected to individual health and lifestyle and highlights how these connections can influence insomnia and other health expressions (Östgöta Commission, 2014). Spielman's 3P model focuses on acute and chronic insomnia (Spielman et al., 1987a;

Spielman et al., 1987b). Together, the two models can be used to explain how various stressors, lifestyle circumstances, and experiences can influence the health of frail older people. By combining the 3P model (Spielman et al., 1987a;1987b) and the Östgöta model (Östgöta Commission, 2014), we can better understand the complex aspects that contribute to insomnia in frail older people. This holistic approach can help to identify potential causes and develop valuable interventions such as weighted blankets (Champagne et al., 2015; Eron et al., 2020; Gee et al., 2016). Rooted in the theoretical framework behind SI and DPS, the use of weighted blankets can be offered as a non-pharmacological intervention to address predisposing, precipitating and perpetuating factors of insomnia (Champagne et al., 2015; Eron et al., 2020; Gee et al., 2016). From a public health perspective (as in the Östgöta model), insomnia is a risk factor for ill health; lack of sleep can correlate with increased morbidity and mortality (Östgöta Commission, 2014). The integration of these models underscores the relationship between social determinants of health. According to SI and DPS theory, the application of a weighted blanket to frail older people has the potential to alleviate physiological arousal associated with insomnia. The comfort of a weighted blanket can offer a solution to predisposing, precipitating, and sustaining factors, promoting improved sleep quality and a sense of security (Eron et al., 2020). Combining these models provides yet another piece of the puzzle by expanding understanding of the interaction between the social determinants of health, lifestyle factors, and insomnia set out in the 3P model (Spielman et aa 1987a;1987b). As an intervention, a weighted blanket appears to be a meaningful support for promoting general health and alleviating insomnia, regardless of what triggered it (Champagne et al., 2015; Eron et al., 2020; Gee et al., 2016).

RATIONALE

When frail older people move to nursing homes, a series of lifestyle changes have taken place. Several of the lifestyle changes that have occurred include multiple and severe health problems, one of which is insomnia. Unfortunately, conventional approaches to managing insomnia usually involve pharmacological interventions, which have potential adverse effects. Consequently, there is a need to explore ways to improve the health of frail older people through alternative insomnia solutions. Improving sleep and preventing insomnia can be necessary for frail older people' general health and well-being. Moreover, insomnia affects other aspects of a person's health. The core purpose of this study lies in its effort to try alternative treatments, such as the use of weighted blankets. Frail older people face challenges related to cognitive weakness and multiple health problems. Living in a nursing home adds another layer of complexity to their situation. Further research is needed to explore the usefulness of weighted blankets for frail older people. Existing research in this area has mainly concentrated on neuropsychiatric diagnoses for children and adolescents. Therefore, further studies are necessary to clarify the effect of weighted blankets on the insomnia (and thus the health and lifestyle) of frail older people. This dissertation aims to contribute meaningful insights regarding alternative treatments that go beyond traditional medical ones and can promote health by impacting the problems associated with insomnia. In this study, an intervention involving a weighted blanket was tested in order to guide and develop strategies that can be seamlessly integrated into nursing home routines. Prioritizing the sleep problems of frail older people may prevent or reduce the risk of other health problems. When intervening in the lives of frail older people, it is essential to remember the principle of the equal value of all individuals: Regardless of age or health, every person deserves equal respect and treatment. For frail older people, this means they must be treated with dignity and respect, regardless of their physical or cognitive state. It also means that their wishes,

preferences, and life history must be considered when designing their care and support. The inclusion of sleep-promoting measures such as weighted blankets in the care of frail older people is one means by which to show consideration for their physical, emotional, and psychological needs. By combining quantitative and qualitative methods of enquiry, this dissertation can provide a more comprehensive understanding of the phenomenon being studied. It offers a complementary perspective on each approach from both an objective and a subjective standpoint. It also helps explain the complexity of weighted blanket therapies and explore and create a more comprehensive understanding of emerging results. The application of both methods of enquiry leads to a deeper and more nuanced understanding, increasing the quality and credibility of the research results.

The ontological and epistemological framework

This dissertation focuses on health and lifestyle and aims to answer specific research questions about the effects of weighted blankets and how users experience them. It takes a pragmatic approach that considers assumptions about the nature of reality (ontology) and how we acquire knowledge (epistemology). The studies referenced here are based on objective knowledge obtained by examining empirical evidence using quantitative methods, validated instruments, and actigraphy. The qualitative approach aims to expand understanding and gain insights by recognizing and exploring the subjective interpretations and constructions of reality made by individuals. This approach acknowledges that knowledge is relative, and that reality is complex. Qualitative research can be experienced through subjective stories, e.g., (Creswell & Clark, 2011; Kaushik & Walsh, 2019; Polit & Beck, 2018). From a pragmatic point of view, knowledge is seen as a continuous spectrum, rather than being limited to purely quantitatively measurable or qualitatively experienced. Thus, this approach does not imply that these are opposites; knowledge is obtained both objectively and subjectively. Pragmatism allows researchers to use quantitative and qualitative methods to answer their

research questions from multiple perspectives (Kaushik & Walsh, 2019; Polit & Beck, 2018). The focus is on both acknowledging the possibility of different views of reality and demonstrating it by using both qualitative and quantitative methods to address the research problem of weighted blanket intervention for insomnia in frail older people (Creswell & Clark, 2011). This approach also provides a holistic perspective to consider and understand the results as a whole, where different parts of quantitative and qualitative results are interconnected and influence each other (Spector., 2016).

OVERALL AND SPECIFIC AIMS

The overall aim was to explore and explore how older people with insomnia who live in nursing home are affected in terms of sleep, quality of life, ADL ability, nutritional status, and medication use, before and after an intervention using a weighted blanket

Study I: The aim of the study was to explore how frail older people with insomnia experience the use of a weighted blanket when living in nursing homes.

Study II: The aim of the study was to explore nursing staff's experiences in how an intervention with weighted blanket influenced residents in nursing homes expression of health.

Study III: The aim of the study was to investigate weighted blankets' effect on health regarding QoL, sleep, nutrition, cognition, ADL, and medication in older people living in nursing homes.

Studie IV: The aim of the study was to investigate the effect of use of weighed blankets on sleep patterns in frail older people in nursing homes.

METHOD

This dissertation comprises four studies (Table 1).

Design

Study I and study II used a descriptive qualitative design and studies III and IV used a quasi-experimental design**.**

Table 1. The studies in this dissertation

	Study I (n=19)	Study II (n=20)	Study III (n=68)	Study IV (n=31)
Design	Descriptive qualitative design	Descriptive qualitative design	Quasi-experimental design	Quasi-experimental design
Sample	Older people	Nursing staff	Older people	Older people
Gender	Female (n=15) Male (n=4)	Female (n=19) Male (n=1)	Female (n=52) Male (n=16)	Female (n=20) Male (n=11)
Age, mean (range)	92 (Age range 67-101)	45 (Age range 25-70)	87 (Age range 67–99)	86 (Age range 67–101)
Procedure	Interviews	Interviews	Instruments	Actigraphy, instruments
Instruments	Interview guide; semi-structured, open-ended questions	Interview guide; semi-structured, open-ended questions	QoL-AD, EQ-VAS, MISS, MNA, S -MMSE (ADL) and medication	Actigraphy, MISS, EQ-VAS
Data analysis	Inductive qualitative content analysis	Inductive qualitative content analysis	Non-parametric Wilcoxon signed-rank test	T-test and Wilcoxon signed rank test

Sample

In studies I, III, and IV, the researchers employed purposive sampling to select frail older people based on International Classification of Diseases (ICD-10) criteria, while nursing staff serving as contact persons for frail older people were included in Study II. The nursing home manager recruited the participation of frail older people or their proxies (relatives) for Studies I, III, and IV, and subsequently relayed the information to the researchers. In Studies I, III, and IV, older people with severe lung or heart diseases and those receiving palliative care were excluded. This preventive action aimed to mitigate the risk of injury to frail older people by ensuring they could independently remove their weighted blanket and avoid respiratory difficulties resulting from its weight on their chest.

In study I, 19 frail older participants aged 67 years and above, with an S-MMSE score above 20, were included. Included were four men and 15 women. Participants' ages ranged from 67 to 101 years, with a mean age of 92.6. Three frail older people discontinued their participation in the study due to death (n = 1) and hospitalization (n = 2). The study was conducted in nine nursing homes across five municipalities in southwestern Sweden. Study II involved 20 nursing staff (contact persons) working in seven comparable nursing homes in municipalities in southwestern Sweden. Three participants declined the interview the day before, with two stated their high workload and one stated illness as the reason. Participants who withdrew from this study came from various nursing homes.

In study III, 68 frail older people completed the study. 42 frail older people discontinued participation due to expressions of discomfort with the weighted blanket due to death (n = 2) and hospitalization (n = 2). The mean age of those who completed the study was 88 years, while the dropouts had an average age of 83 years. The gender distribution of the dropout group was 57% female, whereas those who completed the study comprised 76% females and 24% males. In study IV, 65 were included, 31 frail older people participated fully, while 34

discontinued participations. The mean age of those who completed the study was 85 years, while those who dropped out were 84 years old., Reasons for dropping out of studies III and IV were due to expressions of discomfort with sleeping with the weighted blanket, expressed verbally and/or through facial expressions and gestures.

Intervention

In this dissertation, participants used a weighted blanket for 28 days. Previous studies conducted on insomnia have found that the effect of this intervention on sleep could be seen after 2–5 weeks (Ackerley et al., 2015; Andersson & Vadman., 2012; Ekholm et al., 2020). The studies in this dissertation used blankets weighted with chains. Each weighted blanket weighed between 4 and 8 kg, The chains were sewn into channels that conform to the contours of the user's body. The fabric of the weighted blanket was solid and fireproof. It was deemed inadvisable to use sanitary covers, as they are made from non-breathable material that could lead to suffocation. Research indicates that a weighted blanket weighing 10–12% of a person's body weight can be calming (Mullen et al., 2008). The weighted blankets used in this dissertation replaced the participants' usual, regular blankets, or were sometimes used together with them. In cases where a weighted blanket was combined with a regular blanket, it could be placed either on top of or underneath the regular blanket. To ensure the well-being and comfort of these older people participants, the nursing staff received instructions to observe their reactions when using a weighted blanket. If there were no negative signs, the blanket could be adjusted to cover more of the body, but it was never to be wrapped too tightly around the chest. If the older people in the study experienced any discomfort while using the weighted blanket, it would be removed. If they found the blanket too heavy but still wished to participate in the study, the nursing staff could contact the researchers for a lighter alternative. The nursing staff also received written instructions on how to properly apply the weighted blanket.

Instruments

Interview guide

During Studies I and II, semi-structured interview guides with open questions allowed the interviewees to reflect and speak freely (Kvale & Brinkmann, 2014). The main questions during the interviews with frail older people concerned how they feel when they go to bed, how it felt to lie under the weighted blanket, and how (and whether) it stimulated sleep. The main questions in the interviews with the nursing staff concerned their descriptions of the frail older people, as well as of these participants' sleep before and during their use of weighted blankets. The questions also touched on any observations of other health changes among the study subjects.

Katz's ADLs

The term "activity of daily living" (ADL) was first coined by the American physician Sidney Katz in 1963 (Katz et al., 1963). The Katz ADL ndex is designed for older people and is often used to evaluate their physical ADL function in terms of their ability to perform daily activities. It assesses their performance in six areas: hygiene, dressing, toileting, mobility, bowel and bladder control, and feeding. Each function is classified as independent, partially independent, or dependent (Katz & Akpom, 1979). Six points indicate full independence, and two points or less dependence (Arik, et al. 2015; Wallace et al., 2007). The Katz ADL Index demonstrates high internal consistency with a Cronbach's alpha of 0.838 (Kahle-Wrobleski et al., 2007).

S-MMSE

A standardized Mini-Mental State Examination (S-MMSE) tool was used in the study, comprising 20 questions grouped into 11 domains. The maximum score achievable by the frail older peopleparticipants was 30 points (Folstein, et al., 1975; Kahle-Wroblenski et al., 2007; Molloy et al, 2007). The questions covered various aspects, related to visual and spatial interpretive ability, immediate reproduction, language, memory, and visuospatial functions. A score greater than 20 points is a sign of normal cognitive function. Conversely, scores of less than 20 points indicate the presence of cognitive impairment. The S-MMSE is a highly reliable clinical screening test used to assess cognitive impairment. The internal consistency obtained by Cronbach's alpha indicates a score of 0.82 (Folstein et al., 1975; Kahle-Wroblenski et al., 2007; Molloy et al., 2007).

MISS

The Minimal Insomnia Symptom Scale (MISS) was used to examine study participants' sleep. MISS is an insomnia instrument consisting of three items: difficulty falling asleep at night, the ability to fall back asleep, and how rested an individual feels upon waking. This is in line with criteria from the International Classification of Diseases, ICD-10. Each item is scored on a 4-point Likert scale, from 1 (poor) to 4 (good), with a possible score ranging from 13 to 52 (Broman et al., 2008; Hellström et al., 2010). A ROC analysis identified the optimal cut-off score as 7 with a sensitivity of 0.93, specificity of 0.84, and positive/negative predictive values of 0.256/0.995. MISS has satisfactory reliability, identified by a Cronbach's alpha of 0.73 (Broman et al., 2008; Hellström et al., 2010).

QoL AD

The Quality of Life-Alzheimer's Disease measure, QoL AD, is an instrument that can be used to assess the quality of life of people with Alzheimer's disease and those without the condition (Logsdon et al., 2002). This instrument covers 13 areas of life, including physical health, energy levels, mood, life situation, memory, family, marriage, friends, chores, joy, money, self and life. Respondents can also answer open-ended questions. Each item is scored on a four-point Likert scale, ranging from 1 (poor) to 4 (excellent), with a possible score range from 13 to 52. QoL AD has good reliability, with a Cronbach's alpha of 0.80 (Novelli, 2010).

EQ-VAS

The EQ-5D is a standardied instrument that measures and describes health-related quality of life. It includes a vertical visual analogue scale (EQ-VAS) used in Studies III and IV. This instrument allowed frail older people to score their self-rated health on a scale from 0 to 100, where 0 represents the worst possible health and 100 the best (Ramachandran et al., 2008). EQ-VAS correlates closely with the Medical Outcomes Study Short Form 20 (MOS SF-20) health perceptions scale and has good internal consistency with a Cronbach's alpha (0.70 and 0.72). Moreover, the test-retest reliability of the EQ-VAS is very high, with an intraclass correlation of 0.87.

Actigraphy

Participants in the study IV wore a watch-style actigraphy on their non-dominant wrist, to aid in determining their sleep patterns and circadian rhythms. These devices can be worn for several weeks at a time, and since the 1990s they have been increasingly used to assess sleep/wake behaviour (Ibanez et al., 2018). Actigraphy gathers movement information over

extended periods and typically consists of an accelerometer that quantifies movement. It often includes an event marker button that can be used to denote events such as bedtime and medication intake. Actigraphs are particularly valuable for tracking sleep-wake patterns and rest-activity cycles. Sleep quality and duration measures are computed by applying validated scoring algorithms to movement data. Actigraphy proves beneficial for sleep research due to its cost-effectiveness and less cumbersome nature compared to polysomnography (PSG). It allows for the collection of sleep data in natural settings such as nursing homes (Bucko et al., 2021; Sadeh, 2015). Actigraphy is a technology that enables frail older people to move around and continue their daily routines. At the same time, their sleep data is recorded in their natural sleep environment, making measurement data more applicable to authentic contexts. However, it is crucial to note that actigraphy should not be considered a substitute for polysomnography. In the study IV, actigraphy data for each night was analyzed separately and then averaged over the entire week for various parameters such as time in bed, total sleep time, sleep onset latency, waking after sleep onset (in minutes), sleep efficiency (in percent) and the number of awakenings between sleep onset and wake time.

Procedure

Before conducting the studies I and II a pilot version of the interview guides were tested, resulting in minor adjustments, where questions that were difficult to understand were removed, and questions that provided additional understanding were added. The older people and nursing staff were provided, providing information and instructions prior to the start of the study. Informed consent was obtained from the participants, and in cases where they were unable to give their consent, consent was given by the relative designated as their proxy. Nursing staff were instructed to assist the older people participants in handling the weighted blanket, including trying it on and promptly removing it if any signs of discomfort were observed. Instructions were also given on how to handle the actigraphy used in Study IV In

Study IV, nursing staff responsible for the older people in the studies provided information when the older people were unable to answer questions independently**.** The interviews for Studies I and II were conducted in a peaceful setting at the nursing home, to ensure the participants felt comfortable and secure enough to answer the questions honestly. During the interviews, it was essential to ensure that the participants could speak without interruption. The researchers often remained silent after the participants spoke, to encourage them to share more information, if possible (Kvale & Brinkmann, 2014). In Study I, participants were asked about their sleep quality, insomnia, experiences using the weighted blanket, and overall impressions. One of the interviews was conducted as a pilot, to test the questions. Based on the results, two questions were modified to increase their clarity. This study included the pilot interview, and all interviews lasted an average of 15 minutes, with a length ranging from 10 - 30 minutes. In Study II, nursing staff were asked to describe the sleep of each frail older people participant before and after using the weighted blanket, whether any health changes were observed in the participant, and the older people's activity during the day after following their use of the weighted blanket. Two pilot interviews were conducted, and four additional questions were added following analysis of the results. The pilot interviews were included in the study. The interviews with nursing staff lasted from 25 to 60 minutes. All interviews were digitally recorded and transcribed verbatim.

Data for Studies III and IV were collected at nursing homes, between 2019 and the summer of 2023. Before both studies, a preliminary request for participation was sent to older people or their representatives, along with written information about the studies' purpose and the consequences of participation. Nursing home managers informed the researchers that the older people had agreed to be contacted by the researchers to learn more about the studies and give their consent to participate. At the start of the studies the older people participants were given verbal information once again, and verbal consent was obtained.

In Study III, a baseline assessment of each frail older people was conducted using the instruments described above. The older people and the researcher in charge of this step assessed the questions in the instruments to see if they had the cognitive capacity to answer the questions independently. The responses of older people who scored four or lower on the S-MMSE were evaluated based on input from nursing staff who knew them well (a person-proxy perspective) and the researcher. If the older people had an S-MMSE score between 4 and 10, data were collected via the proxy and the older people. After sleeping with the weighted blanket for 28 days, the older people participant discontinued their use of the blanket. That same day, data were collected using the same instrument used for obtaining the baseline, in order to evaluate the performance of the weighted blanket. Study IV measured insomnia in frail older people participants using actigraphy conducted without a weighted blanket over 28 consecutive days. The frail older people participants and nursing staff received verbal and written instructions for using the actigraphy. After 28 days, a weighted blanket was introduced, and insomnia was measured using the MISS insomnia instrument and health with EQ-VAS. A new round of actigraphy measurements then commenced, which continued for another 28 days, this time using the weighted blanket. After discontinuing the use of the weighted blanket, a follow-up measurement was taken in which the MISS insomnia and EQ-VAS instrument was used tto assesses any changes in insomnia and health levels.

Analysis

Studies I and II were conducted in the form of interviews. They followed a qualitative design and used an inductive approach to describe experiences Study I and observations Study II). When the purpose is to understand rather than to explain, the qualitative method is suitable to describe and illustrate the parts of the phenomena being studied. Therefore, the qualitative method helps establish a basis for new knowledge in the field (Malterud, 2011). For Studies I

and II, the researchers chose a qualitative content analysis method developed by Graneheim and Lundman (2004; 2017). This method aimed to analyse the interviews, identify similar patterns, and describe variations (Graneheim & Lundman, 2004; 2017). The interviews from both studies were analysed based on manifest content analysis, in order to remain faithful to the original text of the interview. The goal was to give a detailed picture of frail older people' experiences and nursing staff observations. To conduct the analysis, the researchers listened to all the interviews and carefully read through the transcribed interview text multiple times. The selected meaning units were condensed into units relevant to the research questions. To maintain context, the surrounding text was included. When the meaning units connected to the study's aim were condensed, this was done in a manner that ensured retention of the essence of the content. Next, the researchers coded the meaning units into code groups and then arranged the code groups based on similarities and differences. In Study I, code groups were sorted into subcategories and categories (without themes). In Study II, only categories were used. The subcategories and categories reflected the central messages of the interviews. These subcategories and categories constituted the manifest content. The text was compared against source material and comparedin order to discover similarities and differences, as well as to ensure that the correct result was in the right place. The analysis phase was a continuous, forward-looking process that involved reflection and discussion to move it forward (Graneheim & Lundman, 2004; 2017).

For studies III and IV, comparative statistical analyses were conducted to examine individual and group differences. the frail older people were their own control group. A paired sample student's t-test was used to compare the mean value of customarily distributed variables from baseline to post-measurement (study III.) Wilcoxon signed-rank test was used to compare data between baseline and post-measurement. Cohen's d was used as an effect size to indicate the strength of the association between two variables and to determine the effect size for

comparative analyses. The suggested cut-offs for interpreting effect sizes were: small = 0.2, medium = 0.5, and large > 0.8 (Field, 2018). In study IV the sample was not normally distributed and therefore non-parametric Wilcoxon signed-rank test was used to compare data between baseline and post-measurement. For descriptive statistics, median and quartiles were used. Rank-biserial correlation was used as a median effect size to compare data between baseline and post-measurement. The suggested cut-offs for interpreting effect sizes were small = 0.10, medium = 0.24 and large = 0.37 (Cohen, 2008; Kerby, 2014). A p-value of $p < 0.05$ was considered statistically significant for all analyses (Field, 2018).

Ethical consideration

The ethics review authority approved all the studies that was carried out (Dnr: 2019-03817). Considering that the studies I, II and IV included frail older people, the well-being of the participants needed to be prioritized over the purpose of the studies (CODEX, 2017) and adhere to the principle of benefit and the principle of no harm, as defined in the Declaration of Helsinki (World Medical Association, 2018).The research information was provided in simple language and adjusted to suit frail older people' conditions and increase nursing staff's understanding. Before the start of the studies, the researchers allowed plenty of time to explain what would happen and give the participants the opportunity to ask questions. During all the studies a calm and safe environment was sought in the nursing homes where it was conducted to ensure that the participants (both frail older people and nursing staff) felt comfortable. Ensuring the protection of participants, particularly the frail older people, was the utmost priority. When dealing with frail older people with cognitive impairment, it is crucial to inform relatives, ask them about their loved one's participation in the study, and reassure them that the study is in the frail older people's best interest. Moreover, nursing staff and frail older people were made aware that they had the option to withdraw from the studies

at any point without any negative consequences. They were also encouraged to discontinue the participation of frail older people who showed the slightest sign of discomfort.

The researchers were committed to ensuring the participants' anonymity. This was accomplished by using descriptions and quotes that did not reveal anyone's identity. The researchers also strived to ensure gender balance in the studies. However, the studies had more female participants, due to the preponderance of women among nursing home residents, frail older people, and nursing staff. The researchers could not influence this gender distribution. As part of the research process, the EU's General Data Protection Regulation (GDPR) (SFS 2018:218) was also taken into account.. The GDPR is designed to protect individuals' rights, particularly their right to have their data protected. The researchers collected only the necessary data's, such as age, gender, and nursing homes, and kept the information separate from the code list. The personal data collected during the study was kept safe and secure. All consent forms, codelists, and collected data were stored in two locked rooms at Halmstad University's Academy of Health and Welfare for ten years. The data analysis was performed on a computer not connected to the Internet, ensuring limited access only to the researchers involved in the studies. The inclusion of frail older people in research study is necessary to gain their perspective, thereby contributing valuable insights. Ethical considerations require a careful understanding of this population's unique characteristics and contributions throughout the research process (Alsaeed et al., 2016).

FINDINGS

Main findings of Studies I and II

Studies I and II showed that weighted blankets provided comfort to frail older people and gave them a sense of security. The studies indicated that the participants who used the blankets were more relaxed and less tired and experienced reduced restlessness and irritability, which increased their general well-being and satisfaction with life. These improvements were both reported by the frail older people (in Study I) and observed by the nursing staff (in Study II). The nursing staff noticed improved sleep, activity levels, and psychological behaviour among the frail older people participants. The older people participants expressed that they found it easier to fall asleep, had an increased desire to go to bed in the evening, and woke less frequently during the night. However, some older people with skin sensitivities experienced discomfort from the weighted blanket and found that correct placement and handling of the blanket were crucial to ensure comfort. Nursing staff (in Study II) observed faster sleep onset, uninterrupted sleep, and later morning wake times. The nursing staff observed changes in the frail older people participants during the day. They were more attentive, active in daily activities and social engagement, expressed emotions more explicitly, and were less anxious. Frail older people in Study I also experienced reduced anxiety and fewer anxious thoughts when using a weighted blanket.

Main findings of Studies III and IV

Study III showed that the use of weighted blankets over the course of 28 days led to significant improvements in the well-being of older individuals. These improvements were seen across several domains, including quality of life (QoL), self-rated health, sleep quality, nutritional status, and cognition. The study identified positive changes in behavioural patterns, orientation skills, and medication use (namely, a reduction in the use of psychoanaleptics).

Study IV showed that the number of awakenings was significantly reduced when frail older people slept under a weighted blanket. This finding was proven by a large effect size. The results demonstrated that using a weighted blanket significantly reduced the time it took to fall asleep and the number of nocturnal awakenings, revealing a large effect size. The increase in EQ-VAS scores was statistically significant, indicating that improved overall health and well-being were associated with using a weighted blanket.

Main findings of all the studies

The findings of Studies I, II, III, and IV indicated that using weighted blankets positively influenced the sleep of frail older people living in nursing homes. This finding was primarily related to the decreased frequency of nocturnal awakenings and was consistent across all the studies. However, Studies I, II, and III suggested that providing weighted blankets to frail older people in nursing homes can also positively affect their overall well-being, emotional state, cognitive functions, nutritional status, and daytime activity levels. The studies highlighted the potential benefits of using weighted blankets as a non-pharmacological intervention to improve the well-being of frail older people. Although Studies I, II, III, and IV indicated that weighted blankets had a positive effect overall, Study IV did not demonstrate any statistically significant changes in all sleep variables. Moreover, it is essential to consider individual differences when implementing weighted blanket interventions, as some frail older adults may experience discomfort when using them.

METHODOLOGICAL CONSIDERATIONS

This dissertation applied both the qualitative method (in Studies I and II) and the quantitative method (in Studies III and IV). Using quantitative and qualitative studies in a thesis project such as this one can yield a more diverse and holistic understanding of the research problem (Creswell & Creswell, 2018). The quantitative method is based on positivist epistemology and realist ontology. This means that objectivity and measurable data are central. The qualitative method follows constructivist epistemology and ontology, in which understanding, and interpretation are central. In this approach, reality is seen as contextual and socially constructed. Combining these two methods can give researchers a more complete and complementary perspective on the research problem. Qualitative studies provide richer and deeper insights into the phenomenon being studied, by exploring the perspectives and experiences of the participants. Quantitative and qualitative studies can strengthen research by offering different perspectives and a deeper understanding of the results (Creswell & Clark, 2011; Polit & Beck, 2018). This enables a more comprehensive treatment of the research question. Iin the qualitative part of the dissertation, the concept used to ensure trustworthiness is that of "credibility, transferability, dependability and confirmability" (Lincoln & Guba, 1985). In the quantitative portion, internal and external validity, reliability and objectivity were used (Polit & Beck, 2018). During the COVID-19 pandemic, it was impossible to conduct site visits to the same extent as previously. This was a weakness, as it led to delayed data collection for all the studies. It is also essential to consider that three out of four of the researchers involved had prior nursing home knowledge, which may have affected how they interpreted the data. To minimise any bias, the researchers identified challenges and strategies and prioritised transparency and validity by thoroughly elucidating every step of the research process. Despite the potential weaknesses, there are advantages to having prior knowledge about frail older people, such as a deeper understanding of practical and clinical aspects,

which can lead to a more detailed analysis of the research question. Prior knowledge can also shape the research question to make the results more valuable and relevant in the environment where the weighted blankets will be used (Creswell & Clark, 2011; Polit & Beck, 2018).

The trustworthiness of the qualitative studies (I and II)

Lincoln and Guba (1985) highlighted the importance of reliability in evaluating qualitative research, specifying four criteria: *Credibility,* reflecting confidence in the 'truth' of findings; *Transferability*, demonstrating applicability in different contexts*; Dependability*, indicating consistency and replicability of findings; and *Confirmability*, representing the degree of neutrality and assurance that respondents shape results, rather than the researcher's influence, motivation, or interest (Lincoln & Guba, 1985). When conducting this research in nursing homes, the researchers needed to be aware of their preconceptions and set them aside. Doing so would help maintain the confirmability, neutrality, and credibility of their work. The challenge to credibility and confirmation lay in the multiplicity of cultural differences within different nursing homes, which requires researchers to inform without directing. By having the nursing home managers handle the participants' requests for study involvement instead of the researchers personally inviting the potential participants to join a study, confirmability and dependability could be maintained (Lincoln & Guba, 1985). Repeated verbal and written communication were used to inform nursing staff about the structure of each study and the importance of their support, thereby increasing its credibility and dependability. Challenges regarding dependability arose when some nursing staff did not correctly receive or understand information, which led to knowledge gaps and resultant measurement errors. Incorrect equipment handling, such as of the weighted blanket, undermined the credibility and dependability of the study. This insight led the researchers to provide more information to nursing staff about the study design and expectations, thereby mitigating such concerns, and increasing credibility, dependability and transferability (Malterud, 2011; Nielsen, 2014;

Proctor et al., 2013). Providing nursing staff with more information and practical guidance improved dependability and by extension, credibility (Malterud, 2011; Zander et al., 2023). The success of the study depended on the nursing staff''s understanding and commitment to the studys aims, which contributed to increased confirmability, as the informants shaped the results (Basinska et al., 2022; Bourbonnais et al., 2020; Klingshirn et al., 2020; Ludwin & Meeks, 2018). Conducting research with a weighted blanket in the actual environment where it is intended to be used may introduce specific errors related to handling and compliance. This can influence the results' credibility, dependability, and transferability, making them unreliable, challenging to replicate, and impossible to transfer. On the other hand, testing the intervention in the intended environment also increases credibility, dependability, and transferability, because it ensures that the results are obtained where the intervention is supposed to work (Malterud, 2011; Polit & Beck, 2018). The involvement of frail older people could affect the credibility and transferability of the intervention. This is because they were unable to express themselves and understand the information due to impaired cognitive, visual, or hearing functions. However, their involvement was crucial since the intervention aimed to address their experiences in their living context. The level of interest of the nursing home managers influenced the data collection process. When they were engaged, it led to increased participation from their entire staff. In cases where the staff's interest was undermined or flagged, frequent research visits helped to maintain motivation. This approach helped to maintain the study's credibility by increasing interest in the study, promoting participation, and thus ensuring confirmability by making the nursing staff, rather than the researchers, the key to the study's success. In addition, the increased involvement of the nursing staff could improve the transferability of the study's results, because they spearheaded the work surrounding the intervention (Malterud, 2011; Polit & Beck, 2018; Zander et al., 2023). In Study I, 19 frail older people were interviewed, and in Study II, 20 nursing staff

members were interviewed. Both studies reached a point of saturation in which no new information or insights could be gained. Further data collection did not produce any new patterns, and saturation was achieved. The research was conducted in multiple nursing homes in southwestern Sweden, lasted for 28 days, and included nursing staff responsible for caring for frail older people. The research enhanced its credibility by incorporating the personal experiences of frail older people. During the analysis, a detailed process was implemented to maintain the credibility of the interviews. Each interview was initially individually reviewed and then compared within the research team to achieve a consensus. All four researchers actively participated in the analysis until unanimous agreement was reached, thus increasing credibility and confirmability. A deep understanding of the context, culture, and social environment in which the study was conducted facilitated the establishment of credibility and transferability.

The trustworthiness of the quantitative studies (*III and IV)*

Internal validity refers to the trustworthiness of conclusions drawn from a study. Conversely, *external validity*pertains to the applicability or generalizabilityof research findings to situations, populations, or settings other than those initially investigated in a study. It concerns how well the research design can support the claim that observed changes or associations are the result of the manipulations or interventions of a study. *Reliability* refers to the consistency and dependability of study observations. Consistent measurements provide stable and comparable results when repeated under similar conditions. *Objectivity* is essential in a study, as it helps to avoid possible bias (Creswell & Poth, 2018). The studies in this dissertation employed a quasi-experimental design, because from an ethical perspective, it was considered inappropriate to conduct a completely experimental study, given the fact that frail older people constitute a vulnerable group, as well as due to difficulties in implementing randomised experiments in nursing homes. The quasi-experimental design was a more

feasible method (Polit & Beck, 2018; Shadish et al., 2002). External validity was still considered high, since the study was conducted in a real-life setting (in nursing homes) and involved frail older people, making the results more applicable to real-world contexts. However, internal validity may be affected by the quasi-experimental design, as it is more challenging to prove causality without complete control over variables, i.e., when it is uncertain whether it was the weighted blanket that affected the outcomes. Selection bias may also exist, since frail older people and nursing staff were not randomly selected. However, frail older people were chosen based on the problem being addressed (insomnia), which was also evaluated. Ultimately, this strengthened internal validity (Polit & Beck, 2018; Shadish et al., 2002). In summary, the quasi-experimental design of this study was a helpful method, but it is essential to be aware of the limitations. The strength of the studies lies in the fact that it was conducted in a natural environment, with frail older people as their own control group. Using the same group as its own control decreases variation between participants (Polit & Beck, 2018), potentially making it easier to detect the actual effects of an intervention, especially considering individual differences that could impact results. By extension, this increases internal validity (Shadish et al., 2002). However, challenges include the risk of learning effects, whereby frail older people and nursing staff are aware of expectations and what will be measured. This affects reliability, because it is difficult to differentiate these effects from actual intervention effects (Polit & Beck, 2018; Shadish et al., 2002). In the study, frail older people with cognitive impairment were minimally affected by learning effects, but still experienced positive results as a result of the use of the weighted blanket. This improved reliability. Nursing staff showed some signs of tiredness or loss of interest, especially since the study period spanned 28 + 28 days. These factors affected the study''s internal validity, as they decreased interest and increased the handling problems surrounding weighted blanket use Fatigue and uncertainty about how to handle the actigraphy were

observed among frail older people and nursing staff, leading to data loss when the device was removed several times before the measurement period was complete. In the case of cognitively impaired frail older people, the actigraph was repeatedly removed and information was lost. This affected reliability, because the study observations were incomplete. However, measurement occurred over an extended period, resulting in rich data collection and strengthening reliability. Repeated information sessions and practical exercises about actigraphy and the weighted blanket addressed uncertainty and tiredness and enhanced the study's reliability. Despite these measures, several challenges persisted due to varying attitudes among nursing staff regarding these activities, which sometimes led to resistance. The complexity was further increased by the fact that the intervention was aimed at frail older people who were dependent upon nursing staff, relatives, and nursing home regulations, which affected the internal validity of studies and the conclusions that could be drawn. However, the location of the intervention in an environment where the weighted blanket could be used naturally was a strength It is challenging to precisely determine other events in frail older people' lives that may have affected the outcomes of the studies, and this makes it difficult to draw general conclusions about the results (Denscombe, 2014). It is difficult to apply the findings from the group of frail older people to other populations, and this may reduce the study's external validity (Creswell & Poth, 2018). Additionally, several frail older people involved in the intervention had low cognitive ability and needed help answering and understanding questions from the instrument and the use of the actigraphy. To ensure internal validity and reliability, researchers were present during the study period introduction, conducted multiple follow-ups, and provided detailed instructions. The first author in Study III assisted in administering the instruments and received assistance from nursing staff familiar with frail older people.

The first researcher conducted several information sessions and practical exercises involving the use of actigraphy and weighted blankets. The repetition of these sessions influenced the study's objectivity due to the researchers' frequent presence at the nursing home. However, the increased knowledge gained by the participants could still lead to improved internal validity of the studies. The studies were conducted at nine nursing homes in southwestern Sweden. However, only 68 frail older people were included in Study III, and 31 in Study IV. These low numbers were a weakness. Power calculations were performed, indicating that a sample size of 34 older individuals was necessary to increase the probability of detecting real effects and improve the reliability of results. This is particularly important when generalising the results to a larger population. Research power was achieved in Study III but not in Study IV. Future studies will require larger sample sizes, in order to reinforce the trustworthiness of conclusions and reliability. The studies also had significant drop-out rates: 42 participants dropped out of Study III and 34 from Study IV, potentially affecting the external validity and reliability of the results. If a large percentage of participants drop out, this can reduce the explanatory power of the studies as it is more challenging to draw firm conclusions about the results, and the studies may be less generaliable to a broader population (Creswell & Poth, 2018; Polit & Beck, 2018; Shadish et al., 2002). To enable generalisation to other populations, results should be based on a considerably larger number of participants. The instruments and actigraphy used for comparative analyses, baseline measurements, and follow-up measurements had high reliability, making the study reproducible (Creswell & Poth, 2018).

DISCUSSION

Weighted blankets are a promising solution for reducing sleep fragmentation, a considerable component of insomnia among frail older people living in nursing homes. The primary outcome observed in all the studies was a decrease in nocturnal awakenings, and thus reduced sleep fragmentation. In studies I, II, and III, improvements in several sleep parameters were

described, including a reduction in the time it took to fall asleep, an increased desire to go to bed, and feeling more well-rested in the morning. Study I highlighted that frail older people were more willing to go to bed and felt more comforted when they used the weighted blankets, which ultimately contributed to improved sleep quality. The observations of nursing staff in Study II further supported these positive results. Staff noted that under the influence of a weighted blanket, frail older people fell asleep faster, experienced fewer sleep disturbances, and had less symptoms related to daytime fatigue. Study III replicated these finding, while Study IV actigraphy primarily measured a reduction in nocturnal awakenings. These results were consistent with previous research conducted on various age groups (Ackerley et al., 2015; Ekholm et al., 2020; Eron et al., 2020; Larsson et al., 2021; Sroczynska et al., 2023), which consistently reported improved overall sleep quality and reduced daytime fatigue symptoms associated with the use of weighted blankets. One causal factor of insomnia can be medication use. While short-term medication can provide relief, it is not a suitable long-term remedy, because it can exacerbate insomnia symptoms. Long-term medication treatment for insomnia is frequently prescribed to frail older people (Hellström et al., 2014; Kume et al., 2016; Rawtaer et al., 2017). Based on the findings of this dissertation and by integrating insights from previous research, it appears that weighted blankets could be an effective, non-pharmacological therapeutic tool that could address the perpetuating factors of insomnia described in Spielman's 3P model, such as inappropriate coping behaviours (e.g., daytime naps) and reduced physical activity due to inadequate nighttime sleep (Ebben & Spielman, 2009; Spielman et al., 1987a; 1987b). In addition to the predictors of ageing and medication, elevated cortisol levels contribute to insomnia. High cortisol levels hinder the brain's ability to relax and enter deep sleep (Stanford Medicine, 2023). The theory of Deep Pressure Stimulation (DPS) suggests that the effectiveness of weighted blankets can be attributed to their ability to induce feelings of security and calmness. This, in turn, reduces cortisol levels

and improves sleep quality (Ackerley et al., 2015; Eron et al., 2020; Hvolby & Bilenberg, 2011). The study showed that weighted blankets can improve insomnia symptoms, particularly sleep fragmentation, in frail older people.

The introduction of weighted blankets into nursing homes is a beneficial strategy for improving the overall health of frail older people by addressing several determinants of health. In the three dissertation studies (I, II, and III) involving frail older people participants, the use of a weighted blanket improved users' well-being, emotional state, cognitive functions, nutritional status, and activity levels, thereby contributing to their overall health. Integrating the results of this dissertation with the Östgöta model's social determinants of health (Östgöta Commission, 2014) and Spielman's 3P model of insomnia (Spielman et al., 1987a;1987) provides a comprehensive framework that considers both the individual genetic and precipitating factors described by Spielman and the determinants of health described by the Östergöta Commission. This can broaden understanding of the causes of insomnia by taking into account various factors (among them individual differences, lifestyle, environment, and social influences) that contribute to the emergence of sleep disorders. Weighted blankets resulted in positive outcomes, including the reduction of negative thoughts (Study I) and improvements in cognitive functions (Studies II and III). Psychological behaviours associated with anxious emotional states hinder relaxation, as described by Stanford Medicine (2023). To address anxious emotional states, the deep pressure stimulation (DPS) ability of weighted blankets is believed to have a beneficial effect on reducing brain activity by soothing the sympathetic nervous system, as described both in theory and previous research (Ackerley et al., 2015; Becklund et al., 2021; Bundy & Lane, 2018; Davis-Cheshire et al., 2023; Eron et al., 2020). The studies (I, II and III) indicated that weighted blankets promoted calm and relaxed emotional states, with improved cognition and increased physical activity. Overall, weighted blanket use generally improved health outcomes in frail older

people who tended towards negative psychological feelings. Previous research supports these findings, suggesting that although personality traits cannot be changed, the alleviation of anxious emotional states can improve well-being. This relates directly to the DPS effect of weighted blankets (Creighton et al., 2017; Mackenzie et al., 2014). Dickson et al.'s (2023) pilot study also showed that weighted blankets promoted calmness and reduced anxiety. Despite limited sample sizes, the study highlighted the potential of weighted blankets as a non-pharmacological option for managing emotional distress (Dickson et al., 2023). This is significant, as frail older people living in nursing homes often suffer from emotionally disturbed behaviour, changes in life situations, pain, and depression (Ettcheto et al., 2020; Praharaj et al., 2018). Weighted blankets offered an advantage by reducing the need for medication and providing some pain relief, as indicated in the studies (I and II). Study III showed a modest reduction in medication use among frail older people using weighted blankets, and this was confirmed by nursing staff in Study II. The research of Steingrimsson et al. (2022) supported this result, and they noted a modest reduction in the use of sleep medications when weighted blankets were prescribed as an alternative intervention, particularly among people with high sensory processing sensitivity (Steingrimsson et al.,2022). Previous studies have revealed that weighted blankets can alleviate anxiety, even among those undergoing chemotherapy. Unlike medical treatments for anxiety, the use of a weighted blanket can be easily discontinued (by removing the blanket) if the patient experiences discomfort (Vinson et al., 2020). The introduction of weighted blankets in nursing homes was a beneficial strategy for improving various determinants of health among frail older residents. The findings of this dissertation emphatically supported the many benefits of introducing weighted blankets in nursing homes, from improving emotional well-being to the blankets' valuable potential as a non-pharmacological alternative.

When introducing weighted blankets to frail older people living in nursing homes, it is necessary to consider individual differences. The dissertation studies underscored that some frail older people may experience discomfort when using weighted blankets. The complaints hey described referred to problems with body and skin sensitivity, as well as various pain conditions. It was difficult to predict which frail older people would experience discomfort. Previous studies testing the efficacy of weighted blankets for patients with disorders such as periodic limb movement disorder (PLMD) showed that weighted blankets worked well in this patient group (Aslam et al., 2023). PLMD is characterised by repeated arm and leg movements during sleep and has been tied to anxious states and restless legs syndrome (RLS). Despite these challenges, the use of weighted blankets resulted in a reduction in leg movements and improved sleep quality, demonstrating the versatility of this form of intervention (Aslam et al., 2023). The studies in this dissertation showed that weighted blankets could safely and positively influence insomnia and overall health. However, it is important to consider individual preferences and tolerance and realise that not all frail older people may appreciate or tolerate weighted blankets. This finding was consistent with the emphasis on personality as a contributor to insomnia highlighted by the Östgöta model (2014) and Spielman's 3P model (Spielman et al., 1987a; Spielman et al., 1987b), in which personality, genetics, and personal experiences can influence perception (e.g., of a weighted blanket). To successfully introduce weighted blankets in nursing homes, it is crucial to consider individual variations. The DPS theory (Bundy & Lane, 2018) emphasises the calming effects on emotions and the central nervous system that weighted blankets can have.

However, the DPS effect can be experienced differently, depending on the individual. In this dissertation, the use of weighted blankets affected and relieved several conditions. However, it was unclear which frail older people might prefer the weighted blanket and find it adequately comfortable. Therefore, the starting point for usage must consider the factors of

individual preference and tolerance levels. Here it should once again be emphasized that frail older people are not a homogeneous group, but rather individuals with myriad differences (Eckerblad et al., 2015; Overbeek et al., 2018; Paque et al., 2017; Ruggeri, 2022). In addition to considerations, it is essential to recognise that not all frail older people can tolerate weighted blankets, particularly those with cardiopulmonary disease or those in palliative care, as indicated by exclusion criteria used throughout the dissertation. Although the introduction of weighted blankets has the potential to improve overall health, various determinants of health, and insomnia, their use must take the personal differences of each individual into account.

CONCLUSION

Weighted blankets have shown promising results in relieving sleep fragmentation, a consequential aspect of insomnia among frail older people living in nursing homes. The introduction of weighted blankets in nursing homes benefits frail older people and improves their overall health. The dissertation has revealed positive effects on well-being, emotional state, cognition, nutritional status, and activity levels. Moreover, weighted blankets have shown some promise in reducing the need for medication and providing pain relief. However, it is essential to note that not all frail older people tolerate weighted blankets. Though the positive effects of weighted blankets should be acknowledged, so, too, must individually differences, as some frail older people may experience discomfort due to sensitivity and pain conditions.

CLINICAL IMPLICATIONS

The implementation of weighted blankets in nursing homes as an intervention for frail older people suffering from insomnia can have significant clinical implications, improving both their well-being and sleep. Weighted blankets have shown the potential to reduce nocturnal awakenings and improve sleep quality among frail older people. The DPS they provide has a calming effect. The use of weighted blankets been shown to improve the physical and cognitive abilities of frail older people. The potential of weighted blankets to induce a state of calm makes them a possible alternative or complementary approach to the management of insomnia without relying solely on medications. In conclusion, the clinical implications of integrating weighted blankets into nursing homes as a treatment for frail older people with sleep issues are significant. Weighted blankets can be a multifaceted tool for improving sleep and general well-being. Guided by healthcare professionals and individualised assessments, their careful use can contribute to a more personcentred approach to care.

FURTHER RESEARCH

Further research is needed and can advantageously investigate how weighted blankets can be adapted to individuals based on their diverse care needs and health conditions. Future studies could explore a broader range of applications for weighted blankets. Understanding these blankets and their potential uses, beyond those associated with sleep, can yield wide-ranging insights into their utility in caring for and serving older people. Longitudinal studies should be conducted to assess the long-term effects of weighted blankets on sleep quality, mental well-being, and overall quality of life among frail older people. Such research is essential to determine the sustainability of weighted blanket use and its positive outcomes. Potential side effects or safety concerns associated with the long-term use of weighted blankets by frail older people should be investigated. Comparative studies ought to be conducted to examine how weighted blankets can be integrated into existing treatments for frail older people. Further research can help develop training programmes for nursing staff, thereby ensuring the proper use of weighted blankets and adequate monitoring during use. Cost analyses should be carried out to assess the health economic implications of implementing weighted blankets as an integral part of older people care. By addressing these research areas, future studies can significantly contribute to understanding how weighted blankets can improve the lives of frail older people living in nursing homes and offer valuable guidance for healthcare professionals and caregivers.

SVENSK SAMMANFATTNING

Bakgrund

I takt med att befolkningen åldras ökar antalet äldre som bor på särskilt boende. Många av dessa sköra äldre personer upplever sömnproblem i form av insomni. Insomni är, enligt definitionen i ICD-10, en sömnstörning som kännetecknas av upprepade svårigheter att somna eller att behålla sömnen, vilket resulterar i påverkan på daglig funktion. Insomni kan påverka övergripande hälsa och välbefinnande. Denna avhandling syftar till att undersöka om en intervention med tyngdtäcke kan förbättra insomni och dess påverkan på hälsan hos sköra äldre personer som bor på särskilt boende.

Användning av tyngdtäcke är ett icke-farmakologiskt alternativ för att öka lugn och förbättra sömnen genom djuptrycksstimulering (DPS). Tyngdtäcken är utformade med noga utvalda material och vikter som stimulerar det centrala nervsystemet (CNS). DPS från tyngdtäcken har visat sig ha positiv påverkan genom att dämpa det sympatiska nervsystemets stressystem och påverka produktionen av lugnande ämnen som melatonin och oxytocin, vilket tycks främja avslappning och förbättra sömn. Rekommenderad vikt är vanligtvis 10–12 % av användarens kroppsvikt, och täcket kan användas både under sömn och dagtid. Studier över olika åldersgrupper och personer med sömnproblem och depression har visat positiva resultat, inklusive förbättringar i insomningstid, nattliga uppvaknanden och minskad ångest. Tyngdtäcket visar lovande terapeutisk potential som ett effektivt och säkert sätt att förbättra sömnkvalitet och välbefinnande. Det finns dock få studier som berör sköra äldre personer på särskilt boende.

Det övergripande syftet med avhandlingen var att undersöka och beskriva hur äldre personer med insomni på särskilt boende påverkas avseende sömn, livskvalitet, ADL-förmåga, näringsstatus och läkemedelsanvändning, av en intervention med användning av tyngdtäcke.

Studie I: Syftet med studien var att undersöka hur sköra äldre personer med sömnlöshet upplever användningen av tyngdtäcke på särskilt boende.

Studie II: Syftet med studien var att undersöka vårdpersonalens erfarenheter av hur en intervention med tyngdtäcke påverkade sköra äldre personers hälsa på särskilt boende.

Studie III: Syftet med studien var att undersöka tyngdtäckets effekt på hälsan avseende livskvalitet, sömn, kost, kognition, ADL och medicinering hos äldre personer som bor på särskilt boende.

Studie IV: Syftet med studien var att undersöka effekten av användning av tyngdtäcke på sömnmönster hos sköra äldre personer på särskilt boende.

I studierna I, III och IV användes ett strategiskt urval av sköra äldre deltagare baserat på ICD-10-kriterier. Rekryteringen skedde via äldreboendets chef. Vårdpersonal, som fungerade som kontaktpersoner för de sköra äldre, inkluderades i studie II. För att minimera riskerna för skador exkluderades äldre personer med allvarliga lung- eller hjärtsjukdomar samt de som erhöll palliativ vård.

Studie I och II använde kvalitativ innehållsanalys med en induktiv ansats för att beskriva upplevelser (studie I) och observationer (studie II). Forskarna valde denna metod för att förstå snarare än förklara och för att etablera grundläggande kunskap inom området.

För studierna III och IV användes jämförande statistiska analyser för att undersöka individuella och gruppvariationer. Eftersom ingen kontrollgrupp ingick betraktades de sköra äldre personerna som sin egen kontrollgrupp.

Avhandlingen indikerade att användningen av tyngdtäcken positivt påverkade sömnen hos sköra äldre personer som bor på särskilt boende. Resultatet var främst relaterat till minskad frekvens av nattliga uppvaknanden, vilket var konsekvent över studierna. Tyngdtäcket visade även ha en positiv inverkan på de sköra äldres övergripande välbefinnande, känslomässigt oroliga tillstånd, kognitiva funktioner, näringsstatus och ork för dagliga aktiviteter. Avhandlingens studier betonade de potentiella fördelarna med att använda tyngdtäcken som en icke-farmakologisk intervention för att förbättra insomni och välbefinnandet för sköra äldre personer på särskilt boende. Det är samtidigt viktigt att beakta individuella skillnader när man implementerar interventioner med tyngdtäcken, eftersom vissa sköra äldre personer upplevde obehag.

Tyngdtäcken har visat lovande resultat vad gäller att lindra störd sömn med flera uppvaknanden – en betydande aspekt av insomni bland sköra äldre på särskilda boenden. Införandet av tyngdtäcken på särskilda boenden gynnar de sköra äldre genom att även förbättra deras övergripande hälsa. Avhandlingen har visat positiv påverkan på välbefinnande, känslomässigt tillstånd, kognition, näringsstatus och aktivitetsnivåer. Dessutom har tyngdtäcken visat en viss potential för att minska behovet av medicinering och erbjuda smärtlindring. Det är dock viktigt att notera att inte alla sköra äldre personer tolererar tyngdtäcken. Trots de positiva aspekterna måste individuella skillnader beaktas, eftersom vissa sköra äldre kan uppleva obehag på grund av känslighet och smärttillstånd.

Sammantaget är de kliniska implikationerna av att integrera tyngdtäcken på särskilda boenden för sköra äldre meningsfulla, eftersom det erbjuder en mångfacetterad metod för att förbättra sömn och allmänt välbefinnande.

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Eva Hjort Telhede

Eva Hjort Telhede is a registered nurse with extensive clinical experience and specialization in older care. She is also trained as an intensive care nurse. Since 2015 she is a teacher and lecturer at the nursing program, Halmstad University. This is her doctoral thesis in health and lifestyle carried out at Halmstad University

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