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A metaphorical model

Noora Narsakka

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To all generations before and all generations after

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ABSTRACT

Older adults' physical activity is often neglected in long-term care despite its importance for health, functioning, and wellbeing. This study aimed to produce a comprehensive understanding of older adults' physical activity promotion in institutional long-term care as nursing practice using the environment. The study was theoretically driven according to the nursing metaparadigm, examining the domains of client, practice, and environment.

A convergent mixed-method design with four phases was used. In Phase I, a systematic literature review was conducted to synthesize earlier literature. In Phase II, using photo-elicitation, and in Phase III, using a mixed-method case study and participatory action, the topic was explored in the Finnish care context. Older adults (n=27), their family members (n=6), and staff (n=30) participated. Collected data included interviews, observations, workshops, and patient record transcripts, among others, as well as pre- and post-measurements of outcomes, such as physical activity. Data were analysed with thematic analysis, descriptive statistics, and Student's T-tests, and integrated using merging and threading. In Phase IV, the findings of Phases I-III were merged in a thematic synthesis according to the nursing metaparadigm domains, developing a metaphorical model.

Based on the findings, older adults' physical activity consisted of basic activities of daily living, independent ambulation, outdoor activity, organized recreation, exercise, and daily chores, of which, only the first three were promoted by nurses. The physical and social environment provided various opportunities to promote older adults' physical activity but their use was limited. Care culture and time formed a context for physical activity promotion. The metaphorical model depicts the relationships of different concepts in the nursing metaparadigm domains, producing a novel holistic perspective for the promotion of older adults' physical activity. The developed model can be used to inform practice, research, and policy to improve physical activity promotion. Future research could focus on developing an adaptable intervention and continuing theoretical development of the model to support nurses in promoting the physical activity of older adults using the environment.

KEYWORDS: environment, gerontological nursing, long-term care, nursing practice, older adults, participatory research, physical activity

TURUN YLIOPISTO
Lääketieteellinen tiedekunta
Hoitotieteen laitos
Hoitotiede
NOORA NARSAKKA: Ikääntyneiden fyysisen aktiivisuuden edistäminen ympärivuorokautisessa palveluasumisessa hoitotyön keinoin ympäristöä hyödyntäen: Metaforinen malli
Väitöskirja, 195 s.
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TIIVISTELMÄ

Ikääntyneiden fyysisen aktiivisuuden edistäminen on puutteellista palveluasumisessa, vaikka fyysisellä aktiivisuudella on merkittäviä hyötyjä ikääntyneiden terveydelle, toimintakyvylle ja hyvinvoinnille. Tämän tutkimuksen tavoitteena oli tuottaa kokonaisvaltainen ymmärrys ikääntyneiden fyysisen aktiivisuuden edistämisestä ympärivuorokautisessa palveluasumisessa hoitotyön keinoin ympäristöä hyödyntäen. Tutkimus pohjautui teoreettisesti hoitotyön metaparadigmaan, tarkastellen sen asiakas-, hoitotyö- ja ympäristöulottuvuuksia.

Tutkimus toteutettiin monimenetelmäisenä yhdistävällä asetelmalla neljässä vaiheessa. Vaiheessa I tehtiin systemaattinen kirjallisuuskatsaus. Vaiheissa II-III käytettiin valokuvaelisitaatiota ja monimenetelmäistä tapaus- ja osallistuvaa toimintatutkimusta ikääntyneiden (n=27), heidän perheenjäsentensä (n=6) ja henkilökunnan (n=30) kanssa. Kerätty aineisto sisälsi muun muassa haastatteluja, havainnointia ja asiakaskirjauksia, sekä muuttujien, kuten fyysisen aktiivisuuden, ennen–jälkeen-mittauksia. Aineisto analysoitiin temaattisella analyysillä, kuvailevin tilastollisin menetelmin ja Studentin t-testeillä, ja integroitiin monimenetelmäisesti. Vaiheessa IV yhdistettiin vaiheiden I–III löydökset temaattisen synteesin avulla hoitotyön metaparadigman mukaisesti ja kehitettiin metaforinen malli.

Tulosten perusteella ikääntyneiden fyysinen aktiivisuus koostui päivittäisistä toiminnoista, itsenäisestä liikkumisesta, ulkoilusta, virkistystoiminnasta, liikunnasta ja arkiaskareista, joista vain kolmea ensimmäistä edistettiin hoitajien toimesta. Fyysinen ja sosiaalinen ympäristö tarjosivat useita mahdollisuuksia fyysisen aktiivisuuden edistämiseen, mutta niitä hyödynnettiin vähän. Hoitokulttuuri ja aika muodostivat kontekstin fyysisen aktiivisuuden edistämiselle hoitotyönä. Kehitetty metaforinen malli kuvaa eri käsitteiden suhteita hoitotyön metaparadigman ulottuvuuksien alueilla, tuottaen uuden kokonaisvaltaisen lähestymistavan ikääntyneiden fyysisen aktiivisuuden edistämiseksi. Kehitettyä mallia voidaan hyödyntää hoitotyössä, tutkimuksessa ja terveyspolitiikassa. Jatkotutkimuksessa voitaisiin kehittää adaptoitava interventio fyysisen aktiivisuuden edistämiseksi hoitotyönä ympäristöä hyödyntäen sekä jatkaa mallin teoreettista kehittämistä.

AVAINSANAT: fyysinen aktiivisuus, gerontologinen hoitotyö, hoitotyö, liikkuminen, ikääntyneet, osallistuva tutkimus, palveluasuminen, ympäristö

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Abbreviations

ADL	Activities of daily living
CINAHL	Cumulative Index of Nursing and Allied Health Literature
ICD	International Classification of Diseases
ICMJE	International Committee of Medical Journal Editors
ICPHR	International Collaboration of Participatory Health Research
ILTC	Institutional long-term care
LTC	Long-term care
MEDLINE	Medical Literature Analysis and Retrieval System Online
MET	Metabolic equivalent
RCT	Randomized controlled trial
RTA	Reflexive thematic analysis
TENK	Finnish National Board on Research Integrity
WHO	World Health Organization

List of Original Publications

This dissertation is based on the following original publications, which are referred to in the text by their Roman numerals:

I Narsakka, N., Suhonen, R., Kielo-Viljamaa, E. & Stolt, M. (2022). Physical, social, and symbolic environment related to physical activity of older individuals in long-term care: A mixed-method systematic review. *International Journal of Nursing Studies*, 135(100), 104350. https://doi.org/10.1016/j.ijnurstu.2022.104350.

II Narsakka, N., Suhonen, R., Groot, B. & Stolt, M. (2023). Promoting activity and mobility in long-term care environments: A photo-elicitation study with older adults and nurses. *Journal of Clinical Nursing*, 32(23-24), 8078-809. https://doi.org/10.1111/jocn.16866.

III Narsakka, N., Suhonen, R., Finskas, J. & Stolt, M. (2025). Promoting the physical activity of older adults in institutional long-term care: A mixed-method case study. International Journal of Older People Nursing, 20(6), e70053. https://doi.org/10.1111/opn.70053.

IV Narsakka, N., Finskas, J., Suhonen, R., Groot, B., Katajisto, J. & Stolt, M. Improving the promotion of older adults' physical activity in institutional long-term care: participatory action research. Manuscript.

1 Introduction

This study aims to produce a comprehensive understanding of the promotion of the physical activity of older adults in institutional long-term care (ILTC) as nursing practice using the environment. The study is theoretically driven, according to the nursing metaparadigm as defined by Kim (2010), focusing on the domains of *client*, that is, the older adults and their physical activity, and the domains of *practice* and *environment* to promote the physical activity of older adults (Kim, 2010, p. 75). The study synthesizes the findings of previous literature, and explores the perspectives of older adults, their family members, as well as staff members in ILTC: it also focuses on improving the promotion of the physical activity of older adults with a participatory research approach.

Physical activity is foundational for human life. It is a means to conduct daily activities, to move around, and to participate in social networks (Moulton et al., 2019). The human body is physically active by nature, and due to the intrinsic functionality of the human body to move, physical activity is vital for the health of an individual (Qiu et al., 2023). Being physically active in older age prevents various illnesses and all-cause mortality (Cunningham et al., 2020), and maintains physical fitness, ability to move, and independence in activities of daily living (Agbangla et al., 2023). Despite experiencing advanced deteriorations in health and functioning (Edgren et al., 2024b), physical activity is a basic human need (Henderson, 1978), and staying as active as possible is vital for health and wellbeing (Cunningham et al., 2020). Therefore, physical activity should also be promoted in ILTC.

ILTC is the most intensive form of long-term care (LTC) services for older adults, whose care and safety related needs cannot be met in the home or in assisted-living settings (Act on Supporting the Functional Capacity of the Older Population and on Social and Health Services for Older Persons 980/2012). In 2023, 4% of adults between the ages of 65 and 74, 7% of those between the ages of 75 and 84, and 16% of 85-year-olds and older resided in ILTC care, this represents approximately 81 000 individuals (Mielikäinen & Kuronen, 2024). The care dependency of older adults in this setting is high; more than two thirds of older adults in ILTC need a substantive amount of help to perform the activities of daily living, and most residents have a formal diagnosis of dementia (Edgren et al., 2024b). Due

to high care dependency, older adults need the support of other people to engage in physical activity, emphasizing the need for a sufficient amount of physical activity promoted by professionals. This also has implications for the costs of care. Physical activity even at significantly lower levels than those recommended for the general older adult population may be beneficial and maintain the physical functioning of older adults in ILTC (Baldelli et al., 2021), thus limiting further increases in care dependency and resources needed to provide care (den Ouden et al., 2015). Moreover, based on the law, care in ILTC settings should be organized to enable older adults to participate in meaningful activities and social interaction, thereby promoting their functioning (Act on Supporting the Functional Capacity of the Older Population and on Social and Health Services for Older Persons 980/2012), and highlighting the need of sufficient physical activity promotion, where possible and appropriate to individual abilities.

Unfortunately, reports on the recurrent evidence of older adults' physical activity levels indicate that older adults mostly engage in passive activities in ILTC (den Ouden et al., 2015; Hahn et al., 2023; Mc Ardle et al., 2021). This is a problem that is affected by various factors. Professional practice to promote older adults' physical activity in ILTC seems to be insufficient. Traditionally physical activity promotion has been the responsibility of rehabilitation professionals, and not a permanent feature of simply taking part in everyday life by the older adults (Baert et al., 2016). However, rehabilitation resources in the ILTC context are often scarce (Kehusmaa & Alastalo, 2021), and alone are not sufficient to promote the physical activity of older adults who are dependent on the support of others to engage in physical activities. On the other hand, in nursing care, physical activity is often reported to be neglected (Ludlow et al., 2021), and nurses' role in physical activity promotion is even contested (Baert et al., 2016). This is despite the role of a nurse being to provide comprehensive care (Henderson, 1978), and the fact that nurses who spend most time with the older adults having various opportunities for physical activity promotion.

In addition, institutional living-environments and cultures may be created to promote passivity rather than activity (Bowes et al., 2022). In ageing policies, physical activity promoting environments have been prioritized as central approaches to promote active and healthy ageing (Ministry of Social Affairs and Health, 2020; World Health Organization, 2020a). However, their implementation in the ILTC environment seems to be insufficient. Overall, the role of the environment has been increasingly acknowledged and investigated as an important component in providing high-quality LTC (Fleming et al., 2020). Employing the environment, older adults' activities, engagement, (Fleming et al., 2020), relationships, and freedom (de Boer et al., 2020) may be facilitated. In this respect, much research has focused on the physical environment (Bourdon et al., 2022; Harrison et al., 2022; Wahlroos et al., 2022). Comprehensive modifications

simultaneously improving the physical environment, meaningful activities for older adults, and care culture (Fleming et al., 2020; Verbeek et al., 2009) have also been explored. To improve older adults' physical activity promotion, addressing all these elements simultaneously could be an approach that produces feasible, sustainable changes in practice (Anderiesen et al., 2014; van Alphen et al., 2016; Wylie et al., 2023). So far research on this has been limited (Narsakka et al., 2022), even more so in the Finnish ILTC context. To explore producing such comprehensive changes, collaboration with those living and working in the ILTC setting is essential (Bowes et al., 2022).

This study is founded on the nursing metaparadigm (Kim, 2010), and explores together with older adults, their family members, and staff members, the physical activity promotion of older adults in ILTC through a cyclical four-phased process (Figure 1). To produce a comprehensive understanding on the topic, the study explores the physical activity of older adults, the promotion of older adults' physical activity, and the environment related to older adults' physical activity. Finally, the findings produced by the cyclical research process are merged to develop a metaphorical model of older adults' physical activity promotion as nursing practice using the environment in ILTC.

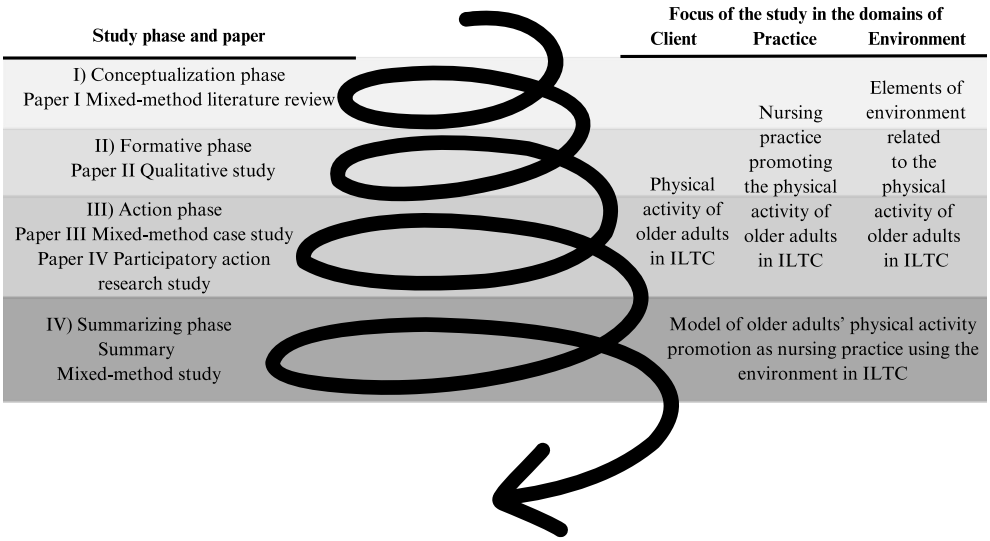

Figure 1. Cyclical four-phased study process exploring the nursing metaparadigm domains of client, practice, and environment in relation to the physical activity of older adults in ILTC.

2 Background

The background of the study consists of three sub-chapters. First, the theoretical framework of the theoretically driven study will be presented, also, a contextualizing of the study (sub-chapter 2.1). Then, a review of the literature will be presented (Sub-chapter 2.2) according to the three domains of the theoretical framework, including: 1) older adults' physical activity in ILTC (domain of the client, Sub-chapter 2.2.1) 2) nursing practice promoting older adults' physical activity in ILTC (domain of the practice, Sub-chapter 2.2.2), and 3) environment related to older adults' physical activity in ILTC (domain of the environment, Sub-chapter 2.2.3). Finally, research gaps and justifications for the study will be presented (Sub-chapter 2.3).

2.1 Theoretical framework

The theoretical framework for the study was based on two theories. These included the typology of theoretical domains of nursing by Kim (2010) and the ecological model of environment and ageing (Lawton, 1989; Lawton & Nahemow, 1973) (Figure 2). The former was used to systematically produce scientific knowledge of the research phenomenon rooted in the conceptualizations of the nursing discipline, and ensuring that the produced understandings are relevant for nursing as a practice (Kim, 2010, pp. 75–76). The latter was used to conceptualize the relationship of an older adult with their environment (Lawton, 1989; Lawton & Nahemow, 1973), producing theoretical understanding of and justification for the research topic of ILTC environment for older adults' physical activity.

The typology by Kim (2010) constructs nursing into four theoretical domains. These include client, client-nurse, practice, and environment. Using the typology, phenomenon essential for nursing can be understood and systematized. It provides a framework that can be used in inductive and deductive conceptual development and subsequent theoretical formulation within and across domains (Kim, 2010, pp. 75–76). At the focus of the study are the client, practice, and environment.

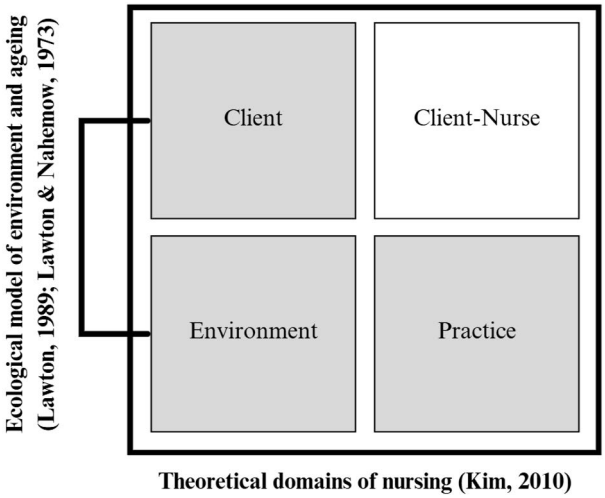

Figure 2. Theoretical framework of the study modified from (Kim, 2010; Lawton, 1989; Lawton & Nahemow, 1973).

Domain of client

The domain of the client focuses on elements in the individuals, dyads, or groups of people receiving nursing care. The elements include the person's health, illness, functioning, emotions, attitudes, experiences, and persona, among others. Understanding these elements is important to produce understandings of phenomenon present in the client, the client's problems and reasons for them, and to deliver the most effective care. (Kim, 2010, pp. 75–77)

Physical activity as the phenomenon at the focus of this study is presented in detail in Chapter 2.2. Briefly, it is a behavior resulting in moving one's body (Moulton et al., 2019). To understand the physical activity of the older adults, other important considerations are their health and functioning, as these have significant impact on their physical activity. Physical functioning is the ability of a person to conduct activities and participate in life situations, including basic activities, such as walking and pushing, and more complex activities, such as activities of daily living, working, recreation, and sports. (Painter et al., 1999) The engagement in these activities requires the complex integration of multiple physiological systems, resulting in physical activity (Garber et al., 2010). Mobility is a sub-set of physical functioning, defined as the ability to get about in one's surroundings by moving, using necessary aids, transportation, and with the help of other people (Webber et al., 2010).

In ILTC, older adults experience multimorbidity and advanced functional decline (Barker et al., 2020). In Finland, 76% of ILTC residents have some dementia diagnosis according to the International Classification of Diseases (ICD) 10 (Edgren

et al., 2024b), and most experience moderate to advanced dementia (Voutilainen & Löppönen, 2016). Dementia leads to impairments in cognitive abilities, memory, executive functions, changes in mood, motivation, behavior, and reduces mobility, balance, and gait (Arvanitakis et al., 2019). This results in difficulties when independently conducting basic and complex activities (Painter et al., 1999). In Finland in 2023, 69% of older adults in ILTC needed substantive help to perform activities of daily living, and decline in functioning for this population was rapid; 39% declined in the performance of activities of daily living during a three-month period (Edgren et al., 2024b). Due to advanced deterioration in health and functioning, older adults in ILTC need the support of other individuals and the environment to engage in physical activity.

Domain of practice

The domain of practice relates to nursing as a work, that is, what a nurse does to address the needs of the clients and helping them (Kim, 2010, pp. 78–79). In the case of this study, the focus is on promoting the physical activity of older adults. To understand nursing practice, it is important to understand the actions that a nurse takes, and the why and how these actions are taken. The domain includes thinking, decision making, assessing, knowledge translation, knowledge use, and techniques and processes used to conduct nursing actions. (Kim, 2010, pp. 78–79)

The majority of professionals in ILTC are practical nurses (70%), and most of their work time (96%) is used in direct resident care. Moreover, nursing assistants (10% of professionals), and registered and public health nurses (7% of professionals) work mostly in direct resident care in ILTC (Saske et al., 2025). In this study, the concepts *nursing staff and nurses* are used to mean practical nurses, nursing assistants, and registered and public health nurses.

Supporting the older adult to conduct basic activities of daily living, takes up most of the nurses' work time in ILTC (Pesonen et al., 2022). Among other duties, nurses work includes facilitating physical and social activities for the older adults (National Supervisory Authority for Welfare and Health Valvira & Regional State Administrative Agency, 2020). However, physical activity and mobility are one of the most often neglected care needs of older adults in ILTC (Kangasniemi et al., 2022; Ludlow et al., 2021). In Finland, one third of older adults perceive that they are not provided with as much recreational or outdoor activity as they would like (Leppäaho et al., 2024). Rehabilitative care is often not provided despite the older adult being assessed as to benefitting from it (Edgren, 2021).The lack of nurses perceiving that older adults' physical activity is important (Trollebø et al., 2024) or the promotion of it as a part of their role (Hallam & Lewis, 2022) impedes physical activity promotion as nursing practice.

Furthermore, traditionally physical activity has been the responsibility of physiotherapists, and promoted by them as physical rehabilitation and exercise in the ILTC setting (Baert et al., 2016). In the scientific literature, activity interventions in ILTC are mostly implemented by physiotherapists and other external professionals or persons (Wylie et al., 2023). This kind of approach positions physical activity in a somewhat separate position from the daily life and activities of older adults (Siira et al., 2021). Furthermore, rehabilitation professionals in Finland account for approximately 2% of professionals working in ILTC (Kehusmaa & Alastalo, 2021), and only a minority (18% in 2023) of older adults receive the help of rehabilitation professionals, such as physio- or occupational therapists, or other specialty professional, such as social workers (Edgren et al., 2024b). As other professionals' resources are limited in the ILTC settings, the role of the nursing staff is emphasized in promoting the physical activity of older adults.

Domain of the environment

The domain of the environment relates to the external conditions of the client and the context in which nursing practice takes place (Kim, 2010, p. 79) as being important to consider for the promotion of older adults' physical activity in ILTC. The environment consists of spatiality, temporality, and qualitative dimensions of the environment. Spatiality refers to the proximity of elements in the qualitative dimensions of the environment to a person. Temporality refers to the frequency of the presence of these environmental elements. (Kim, 2010, pp. 195–197) The qualitative dimensions of the environment include the physical, social, and symbolic dimensions, described in more detail below.

The physical environment includes elements that can be seen and touched, that is, materials things, such as the nature, built environment, and objects (Kim, 2010, p. 197). Traditionally ILTC has been organized in closed settings (Driessen et al., 2017) with locked doors and enclosed buildings (Artner, 2018). The private space of an older adult usually consists of a room with a bathroom (Wahlroos et al., 2021), for which the older adults pay rent, and can furnish and decorate as they like, at least to some extent. The residents share common spaces, such as a kitchen and a living room in their unit, and use corridors to move between spaces (Portegijs et al., 2022b). Some units have other shared facilities, like gyms, and outdoor spaces, like gardens, but residents usually cannot enter these areas independently (van Liempd et al., 2022).

The social environment includes human interrelations and social groups a person belongs to (Kim, 2010, p. 197). Moving to ILTC significantly narrows the social environment of an older adult (Paananen et al., 2024). In ILTC, older adults' social environment mostly consists of those persons residing and working in the units.

Visits to residents are mostly made by family members, including spouses and children (Paananen et al., 2024). Close relationships between residents are important for the older adults (Cater et al., 2022). Staff members produce a significant part of older adults' social connections (Gebhard et al., 2024), however, nurses often experience a lack time to interact with the older adults (Paananen et al., 2024), and shortage of staff and nurse retention are issues (Rostgaard et al., 2022). Loneliness is common; more than one fifth of ILTC residents always or often experience loneliness (Leppäaho et al., 2024).

The symbolic environment is intertwined with the "sociality" of humans, relating to human history, language, culture, and comprises shared ideas of people, such as values, and norms (Kim, 2010, p. 208). Symbolically, the institutional care environment poses on the older adult a daily life that is formally organized and structured with schedules, routines, and rules (Martin, 2002). Furthermore, the older individuals' bodies are subjected to others' authority and control, considering the environment they can use and the activities they may take (Hammink et al., 2025; Martin, 2002). Adjusting to these factors may challenge the older adults' feeling of having control over their life, and even their identity (Artner, 2018; Hage & Lorensen, 2005).

Due to the significant, permanent role of the ILTC environment for older adults, considering its quality becomes vital to provide high-quality care. Furthermore, the poorer the older adults' functioning, the more crucial the quality of the environment becomes, as expressed with the ecological model of environment and ageing (Lawton, 1989; Lawton & Nahemow, 1973).

The ecological model of environment and ageing

The ecological model of environment and ageing (Lawton, 1989; Lawton & Nahemow, 1973) stems from the field of environmental gerontology. According to the theory an older adult's behavior and well-being are defined by the balance between their competence and the demands of the environment. Competence means the individual's physical, cognitive, and social abilities. Demand on the other hand is stimuli from the environment. If the older adult's abilities do not meet the stimuli of the environment, this leads to maladaptation. The stimuli can be too challenging or not sufficiently stimulating, producing too high demands or under-stimulation, respectively. As the abilities of an older adult decrease with age and worsening health, the environment can be adapted to meet these abilities, and therefore, compensate for the loss of competence. (Lawton, 1989; Lawton & Nahemow, 1973) Due to this interdependence of the older adult with their environment, the care environment should be perceived as an active component in providing ILTC (de Boer et al., 2020).

Traditionally LTC facilities have been very institution-like (Klaassens & Meijering, 2015), even resembling hospitals (Wahl et al., 2012). Currently, it is acknowledged that a high-quality ILTC environment facilitates activities, engagement, a sense of home and belonging (Fleming et al., 2020), relationships, and freedom for the older adults (de Boer et al., 2020). Much research has focused on the physical environment (Bourdon et al., 2022; Harrison et al., 2022; Wahlroos et al., 2022). Research has also been conducted on comprehensive environmental modifications, addressing the overall model of providing care, improving the physical environment, meaningful activities for older adults, and care culture (Fleming et al., 2020; Verbeek et al., 2009), providing more person-centered care (Harrison et al., 2022). However, there is lack of research comprehensively addressing all the dimensions of the environment in relation to the physical activity of older adults.

A summary of the theoretical framework is presented in Table 1. The ecological model of environment and ageing (Lawton, 1989; Lawton & Nahemow, 1973) is not presented separately but the understanding produced is integrated into the domains of client and environment.

Table 1. Summary of theoretical framework.

Theoretical framework – Summary		
Client	**Practice**	**Environment**
• Older adults in ILTC experience multimorbidity and advanced functional deteriorations. • They require the support of care professionals to meet their basic needs. • They are susceptible for the quality of the environment.	• Traditionally rehabilitation professionals have been responsible for the promotion of older adults' physical activity but have limited resources in ILTC. • Older adults' physical activity is often not sufficiently promoted as a part of nursing practice.	• The ILTC environment limits older adults' free movement, engagement in social interaction, and requires adjusting to structured routines and rules. • The environment may facilitate activities and freedom if adjusted to meet the older adults' functioning.
For older adults to engage in physical activity, physical activity promotion by professionals and the environment is vital.	**The role of nursing is underdeveloped but important in the promotion of older adults' physical activity in ILTC.**	**The environment plays a significant role in the daily life of older adults in ILTC and is important to consider for physical activity promotion.**

2.2 Review of literature

In this sub-chapter, a review of the literature will be presented. The literature was investigated and will be presented according to the three domains of the nursing metaparadigm provided in the focus of this study: older adults' physical activity (domain of the client, Sub-chapter 2.2.1), nursing practice promoting older adults' physical activity (domain of practice, Sub-chapter 2.2.2), and the environment related to older adults' physical activity in ILTC (domain of the environment, Sub-chapter 2.2.3).

To provide a comprehensive background, extensive literature was reviewed on the topic of older adults' physical activity (domain of the client), and two systematic searches were conducted on the topics of: 1) promoting older adults' physical activity as nursing practice in ILTC (domain of practice), and 2) environmental elements related to older adults' physical activity in LTC (domain of the environment). Considering the latter search, a comprehensive synthesis of studies published before 2021 was conducted as Paper I, and an update is presented in Sub-chapter 2.2.3.

A systematic approach was used to conduct the review of literature (Table 2). A library information specialist was consulted to formulate search strings (Appendix 1, 2). To select relevant articles, Covidence systematic review software was used to first screen titles and abstracts, and then review selected full texts against predefined eligibility criteria. For Search 1, studies that considered older adults aged 65 and over, in the context of institutional full-time LTC were included. If only a sub-population of older adults was participating in the study, for example, individuals with stroke rehabilitation or mental health disorders, the study was excluded. As the majority of older adults in ILTC in Finland experience dementia (Edgren et al., 2024b), studies including only individuals with dementia were eligible. The study had to intervene in older adults' physical activity by some means involving nursing staff in a significant role in the activity-delivery. Studies observing current practices of nursing staff or involving nursing staff only in a supportive role in activity-delivery were excluded. Only scientific, empirical, peer-reviewed, English- or Finnish-language research articles were included, excluding reviews, protocols, and dissertations. For Search 2, the same eligibility criteria were used as in Phase I (see Paper I). The articles included in this dissertation were excluded from the systematic literature review conducted for the background section. No other studies were identified from Finland in either of the searches.

A narrative approach (Popay et al., 2006) was used to synthesize the findings of the included studies. Each of the searches corresponded to one of the domains of the nursing metaparadigm but their results were used to also complement each other (Figure 3). Furthermore, in Paper I, nurses were examined as a part of the social environment for older adults, but in the present study, nursing practices related to

older adults' physical activity are presented under the domain of practice (for more information, see Chapter 4.1 Methodological approach and study designs, p. 43).

Table 2. Study inclusion and characteristics of literature reviews.

	Search 1	**Search 2**
Focus	Promoting older adults' physical activity as nursing practice	Environmental elements related to older adults' physical activity (update for Paper I)
	Systematic search strategy	
Search terms	older adult, long-term care, physical activity, promotion, synonyms and similar relevant concepts	older adult, long-term care, physical activity, environment, synonyms and similar relevant concepts
Databases and searches	From inception until 31.3.2025 PubMed, CINAHL, and Cochrane library 2536 references, 710 duplicates	1.1.2021-31.3.2025 PubMed, CINAHL, Cochrane library, and PsycInfo 425 references, 139 duplicates
Inclusion	Screening of 1826 articles 261 read as full text 20 articles included From manual search of reference lists 2 Included altogether 22	Screening 286 articles 27 read as full text 12 articles included From manual search of reference lists 0 Included altogether 12
	Characteristics of included studies	
Publishing year	before 2000 (n=2) 2010-2019 (n=8) 2020-2025 (n=12)	2021-2025 (n=12)
Country	Europe (n=13) North America (n=4) Asia and Oceania (n=5)	Europe (n=9) North America (n=2) Europe and North America (n=1)
Study design	RCT or cluster RCT (n=8) Quasi-experimental or uncontrolled pilot study (n=7) Qualitative study (n=4) Feasibility study (n=2) Multiple case study (n=1)	Qualitative study (n=7) Mixed method-study (n=2) User centred design (n=1) Bipartite exponential random graph models (n=1) Pragmatic observational study (n=1)
Included older adults	Of 19 studies (reporting): Sample sizes between 3-907 Mean age between 79-89 Mostly women Heterogenous cognitive and physical functioning	Of 6 studies (reporting): Sample sizes between 6-76 Mean age between 79-86 Mostly women Heterogenous cognitive and physical functioning

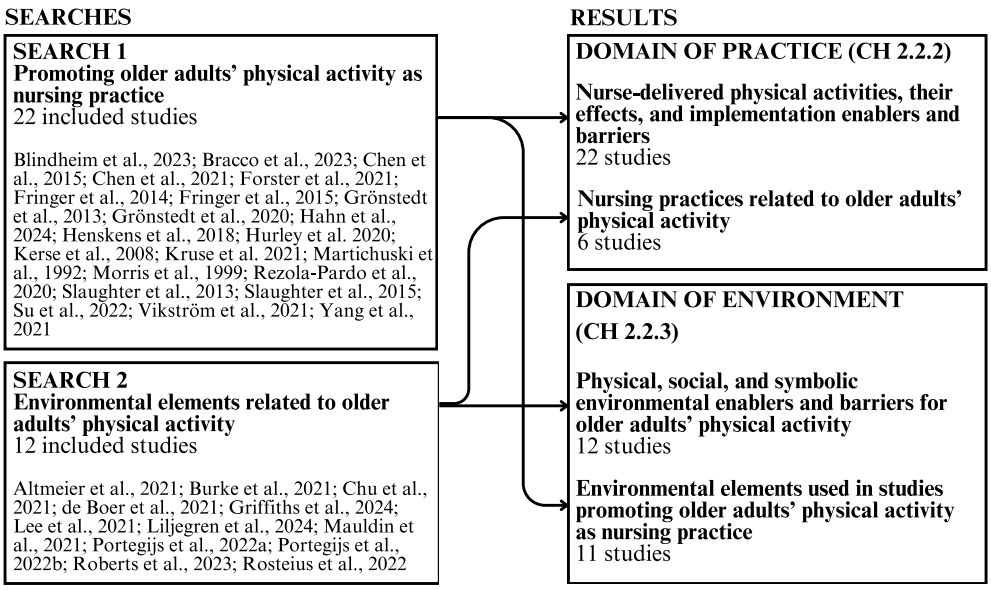

Figure 3. Flow chart of search results contributing to the reviews of literature of the practice and environment domains.

2.2.1 Older adults' physical activity in institutional long-term care

The phenomenon present in the domain of client at the focus of this study is physical activity. In this sub-chapter the characteristics of physical activity and the evidence on the importance of physical activity for older adults in ILTC will be presented.

Physical activity

Physical activity is a behavior resulting in moving one's body (Moulton et al., 2019). It is often defined in research as any bodily movement produced by skeletal muscles that results in energy expenditure (Caspersen et al., 1985). Physical activity is vital in the sustenance of life (Caspersen et al., 1985) and a means to participate in daily life activities and social interactions (Moulton et al., 2019). At the level of the body, physical activity maintains important physiological functions, keeping and restoring balance in the body at the whole organism level, in tissues, within cells, and at the molecular level (Qiu et al., 2023). Due to this multifaceted role of physical activity for the human being and body, physical activity is vital at any age and irrespective of one's functioning, provided the individual is capable of engaging in it.

When examining physical activity in more detail, its type, intensity, duration, and frequency are considered (Barisic et al., 2011). Physical activity types are often

divided into four domains in relation to the part of daily life in which they take place (Caspersen et al., 1985), including occupational, transportation, household, and leisure time activity exercise (Quinn & Barone Gibbs, 2023). Exercise is often used interchangeably with physical activity. However, it is a sub-category of physical activity that is planned and structured with the purpose of maintaining or improving physical fitness. (Caspersen et al., 1985)

The intensity of physical activity is often expressed as metabolic equivalents (METs). One MET represents the amount of oxygen consumed by a person sitting at rest, that is, the resting metabolic rate (Jetté et al., 1990). Energy consumption at 1.5 METs or less is consumed in a sitting, reclining, or lying position. This is referred to as being sedentary, that is, not producing any physical activity. (Tremblay et al., 2017) Other categories of physical activity include light, moderate, vigorous, and high intensity (Table 3).

Table 3. Physical activity intensity categories.

Activity category	Energy consumption (Norton et al., 2010)	Example activities (Ainsworth et al., 2000)
Sedentary	1.5 METs and less	Sitting, reclining, or lying
LIght	1.6-3 METs; no noticeable change in breathing	Light walking, watering the plants, doing one's hair, eating, baking
Moderate	3-6 METs; raises breathing rate of a person, still being able to have a conversation whilst engaged in activity	Fast walking, heavy housework, dancing, playing doubles tennis
Vigorous	6-9 METs; raises breathing rate to a level in which a conversation cannot be maintained uninterrupted	Cycling, aerobics, water jogging
High	>9 METs; cannot be usually performed for more than ten minutes	Mostly relevant for athlete training

The duration of physical activity means the time one engages in physical activity per session. The frequency of physical activity means the recurrence of sessions one engages in physical activity per a given period of time. The time periods most often used to assess physical activity are one day or one week. (Caspersen et al., 1985)

Importance of physical activity for older adults in ILTC

For older adults, being physically active has various benefits for physical and mental health, functioning, and quality of life (Agbangla et al., 2023; Baldelli et al., 2021; Brett et al., 2016; Cunningham et al., 2020; Valenzuela et al., 2023). These include

preventing mortality, various diseases, reduced risk of health-related issues, and improvements in functional, behavioral, mental health, and quality-of-life outcomes (Table 4). On the other hand, not being physically active, produces a vicious cycle of further decline in health and functioning. Physical functioning and mobility are decreased (Ferrucci et al., 2016), and reliance on care increases (den Ouden et al., 2015), making it even more difficult to engage in physical activities and social life (Shi et al., 2025). Furthermore, the risk of falls, pressure ulcers, malnutrition, and urinary incontinence are elevated (Lahmann et al., 2015).

According to international (World Health Organization, 2020b) and Finnish (UKK-instituutti, 2019, 2020) physical activity recommendations, older adults should engage in any type of aerobic activity for 150 minutes on a moderate intensity-level or 75 minutes on a vigorous-intensity level per week. In addition, older adults should engage in muscle strength training, and conduct balance and coordination exercises two times per week. It is also recommended to pause being sedentary as much as possible, as sedentary behavior produces harms on its own, irrespective of meeting the recommended levels of physical activity. (UKK-instituutti, 2019, 2020; World Health Organization, 2020b) For older adults in ILTC, including persons with dementia and using wheelchairs, it is recommended to conduct twice a week endurance, muscle strength, balance, and coordination exercises for 35-45 minutes per session. In addition, every day, sedentary time should be stopped 3-4 times per day by engaging in few minute bouts of physical activity. (de Souto Barreto et al., 2016; Peyrusqué et al., 2023)

Table 4. Benefits of physical activity for older adults in ILTC.

Physical activity benefits for older adults	
Prevents:	
all-cause and cardiovascular disease mortality	Cunningham et al., 2020
cancer	Cunningham et al., 2020
cardiovascular disease	Cunningham et al., 2020
cognitive decline and dementia	Cunningham et al., 2020
depression	Cunningham et al., 2020
Reduces:	
falls	Agbangla et al., 2023
fear of falling	Baldelli et al., 2021
fractures	Cunningham et al., 2020
negative behaviors, such as agitation	Brett et al., 2016
body pain	Baldelli et al., 2021
Improves	
(or maintains) independence in activities of daily living	Agbangla et al., 2023; Baldelli et al., 2021; Brett et al., 2016; Cunningham et al., 2020; Valenzuela et al., 2023
autonomy	Baldelli et al., 2021
mobility	Agbangla et al., 2023; Baldelli et al., 2021; Brett et al., 2016; Cunningham et al., 2020; Valenzuela et al., 2023
cognition	Brett et al., 2016
depressive symptoms	Agbangla et al., 2023; Baldelli et al., 2021; Brett et al., 2016
anxiety level	Baldelli et al., 2021
mood	Brett et al., 2016
sleep quality	Baldelli et al., 2021
life satisfaction	Baldelli et al., 2021
social interaction	Baldelli et al., 2021
quality of life	Cunningham et al., 2020

However, due to advanced deteriorations in health and functioning, engaging in the recommended moderate or vigorous intensity activity might no longer be feasible for older adults in ILTC (Mc Ardle et al., 2021). Internationally, recurrent evidence shows that older adults in the ILTC settings are active at lower levels than recommended. This is referred to as being inactive (Thivel et al., 2018). The reported forms of physical activities older adults engage in ILTC, include mostly activities of daily living, light household work, and mobility (den Ouden et al., 2015; Hahn et al., 2023; Mc Ardle et al., 2021). Physical activity is conducted mostly at a light intensity (Mc Ardle et al., 2021), in short bouts of less than ten minutes with long sedentary times in between (Parry et al., 2019). Overall levels of physical activity remain low. The time older adults engage in physical activity ranges between 8 to 15 percent of the day (den Ouden et al., 2015; Hahn et al., 2023; Liu et al., 2020; Mc Ardle et al., 2021; Parry et al., 2019). Research evidence from the Finnish context is currently lacking.

As any physical activity is better than being sedentary (World Health Organization, 2020b), increasing the level of light-intensity activity should be considered as an alternative to moderate and vigorous activity in ILTC (Mc Ardle et al., 2021). Light intensity activity has been observed to produce improvements in health and functional outcomes for older adults (Baldelli et al., 2021). Furthermore, the greatest benefits of physical activity for the risk reduction of all-cause mortality and various diseases are achieved when moving from no or minimal activity to any increased level of physical activity (Warburton & Bredin, 2017). Considering the current low activity levels of older adults, these factors highlight the importance of increasing physical activity to any achievable level in ILTC (Table 5).

Table 5. Summary of review of literature for the domain of client.

Domain of client – Summary
• Physical activity is important for older adults' physical and mental health, functioning, and quality of life. • Based on international evidence, physical activity in ILTC is conducted at very low levels, at ligh intensity, and mostly in activities of daily living, light household work and mobility. • Even small increases in physical activity could produce benefits for the older adults. **Current evidence of older adults' physical activity levels points to the need to improve physical activity promotion. To respond to these observations, this study will take a comprehensive focus on older adults' physical activity and its promotion, exploring different ways to promote older adults' physical activity in ILTC.**

2.2.2 Nursing practice promoting older adults' physical activity in institutional long-term care

The domain of practice, is at the focus of this study as it presents the means of promoting older adults' physical activity as nursing practice. This sub-chapter will synthesize nursing practices related to older adults' physical activity in ILTC from the earlier literature (Search 2) as well as the delivered physical activities: their effects, implementation enablers, and barriers when intervening in older adults' physical activity as nursing practice (Search 1).

The earlier literature has produced knowledge about **nursing practices and interventions** for older adults' physical activity **relating to basic care activities and organized physical activities**. A relatively low number of studies were identified intervening in older adults' physical activity as nursing practice (n=20). The interventions used were heterogenous, highlighting the variety of opportunities there are to promote older adults' physical activity as nursing practice. However, due to the heterogeneity of the interventions, the participants included, and the assessed outcomes, no clear conclusions could be made of their effectiveness. Various nurse-related factors are important to consider when intervening in older adults' physical activity as nursing practice.

Nursing practices related to older adults' physical activity

Taking more time in daily care correlated with improved activity levels of older adults (Portegijs et al., 2022b). In addition, physical activity could be increased by involving older adults in other tasks beyond basic care situations, **doing things together** with the older adults and **giving them responsibility for daily life tasks**, such as returning dirty dishes, taking out the trash, and cleaning the residents' room (de Boer et al., 2021; Rosteius et al., 2022). To organize physical activities, activity promotion required **adjusting delivery according to functioning**, when older adults experienced dementia, for example, by using repetition and showing movements with one's body. **Encouraging and praising** older adults facilitated activity. (Burke et al., 2021)

The competences of nurses as regards being able to take on multiple responsibilities simultaneously and to incorporate activities into daily practice (de Boer et al., 2021), as well as flexibility (de Boer et al., 2021; Portegijs et al., 2022a) enabled older adults' physical activity. To be able to promote older adults' physical activity, **education and mentoring** from more experienced colleagues were important (Griffiths et al., 2024). **Collaboration** with other professionals (Portegijs et al., 2022a) and family members (Portegijs et al., 2022a; Rosteius et al., 2022) benefitted physical activity promotion. **Managerial processes** were important to establish activity promoting practices and policies (Griffiths et al., 2024). **Impeding**

factors for activity promotion included low staffing levels (Burke et al., 2021; Portegijs et al., 2022a) and not perceiving activity promotion or activity-related decision making as a part of the nurses' role (Portegijs et al., 2022a).

Nurse-delivered physical activities, the effects, and implementation enablers and barriers

Most studies focused on **intervening in physical activity in basic care or delivering single-type new activity for older adults** (Table 6). Three studies increased older adults' physical activity by increasing independence in activities of daily living, and two studies used kinesthetics training for nurses to improve mobility care. In thirteen studies a new physical activity was used, including group exercise, sit-to-stand activities, walking, group activities, a technological solution, and dancing. The doses of the activities varied from daily to weekly, for example, sit-to-stand activities were short but conducted several times per day, exercise was delivered mostly for 30-40 minutes three times a week, and dancing for one hour once a week (Table 6).

Three studies intervened in older adults' physical activity **integrating physical activity in different parts of older adults' daily life** (Table 6). In these studies, activity promotion plans were made based on needs assessments for the units or older adults. In two of these studies, nursing staff were involved in evaluating current practices, developing new solutions for activity improvement, implementing selected solutions, and evaluating changes; older adults and family members were also involved to some extent. (Forster et al., 2021; Hahn et al., 2024) In the third study, assessments and plans were made by physio- and occupational therapists, for the nursing staff to subsequently implement (Hurley et al., 2020).

Table 6. Studies promoting older adults' physical activity as nursing practice. Studies being part of the same research project are presented in the same row.

Studies	Intervention components, dose, frequency, duration, individualization	Nurses' role in delivery*		Training for nurses
		Only	Collabor.	
Group exercise				
Chen et al., 2015	Progressive seated training, stretching and aerobic exercises, 40 min, 3 times/week, 6 months		x	yes
Chen et al., 2021	Progressive training, strength and balance exercises, individualized, 30min, 3 times/week, 12 weeks	x		
Morris et al., 1999	Progressive training, alternate sessions of strength exercises 3 non-consecutive days/week and walking on alternate days, individualized, 10 months		x	yes
Su et al., 2022	Stretching and aerobic exercises, 40 min/session, 3 times/week, 3 months	x		yes
Sit-to-stand activities				
Grönstedt et al., 2020 Vikström et al., 2021	Repeated raising up form a chair and sitting, during daily activities, 1-10 repetitions per session, 4 times/day, protein-rich nutritional supplements 2 times/day, 12 weeks	x		yes
Slaughter et al., 2015 Slaughter & Estabrooks, 2013	Repeated raising up form a chair and sitting, during daily activities, repetitions individualized according to functioning, 4 times/day, 6 months	x		yes
Walking				
Rezola-pardo et al., 2020	Daily, progressive walking activity, dose individualized, 3 months		x	
Yang et al., 2021	Daily, progressive walking activity, dose individualized, 5 weeks		x	

Studies	Intervention components, dose, frequency, duration, individualization	Nurses' role in delivery*		Training for nurses
		Only	Collabor.	
Other single-type activity interventions				
Martichuski et al., 1996	**Group activities** in cognitively similar small groups, including passive activities and physical activities, when nurse had time/on average once per week, 12 weeks	x		
Blindheim et al., 2023	**Technological solution**: Group exercise organized using a programmable semi-humanoid robot used by nursing staff, 15-30 minutes/session, 5 days/week, 4 weeks	x		yes
Bracco et al., 2023	**Dancing**: Therapeutic tango sessions, 1h/session, 1 session/week, 12 weeks		x	yes
Increasing independence in activities of daily living				
Henskens et al., 2018	Conducting basic and instrumental activities of daily living more independently than before, individualized		x	yes
Kerse et al., 2008	Conducting basic activities of daily living more independently than before, individualized	x		yes
Morris et al., 1999	Conducting basic activities of daily living more independently than before, individualized	x		yes
Kinesthetics				
Fringer et al., 2014 Fringer et al., 2015	Kinesthetics training for nurses to support older adults' physical activity and participation in daily activities, theoretical teaching and practical training, 4 days + 1 day after 4 months	x		yes
Increasing activity throughout daily life				
Forster et al., 2021	Group and social activities, activities of daily living, ambulation, changes in the environment		x	yes
Hahn et al., 2024	Exercise, group and social activities, activities of daily living, ambulation, changes in the environment		x	yes
Hurley et al., 2020	Training for staff to encourage different physical activities, changes in the environment, individualized		x	yes

* = Nurses being the only professionals or collaborating with other professionals or persons to deliver activities

Physical activity delivery was conducted in half of the studies, **solely by nurses**. In fifty percent, physical activity was delivered **in collaboration with other professionals and persons**, including physio- and occupational therapists (Henskens et al., 2018; Hurley et al., 2020), a dance movement therapist, a musician (Bracco et al., 2023), research staff (Rezola-Pardo et al., 2020; Yang et al., 2021), and family members and volunteers (Chen et al., 2015; Hahn et al., 2024; Morris et al., 1999; Rezola-Pardo et al., 2020).

Fourteen studies measured the effects of the nurse-delivered physical activity on older adult outcomes, including mobility, cognitive functioning, function in basic activities of daily living, mental health, and quality-of-life (Table 7). Other outcomes included physical activity (Hurley et al., 2020; Rezola-Pardo et al., 2020), behaviors (Henskens et al., 2018; Hurley et al., 2020; Martichuski et al., 1996), falls (Kerse et al., 2008), sleep (Chen et al., 2015), body weight and composition (Grönstedt et al., 2020), self-efficacy (Yang et al., 2021), and health status (Slaughter et al., 2015). **Evidence on effectiveness was heterogenous**, group exercise showing most promise to improve older adult outcomes (Table 7). However, none of the exercise interventions included an older adult population experiencing moderate to advanced dementia, thus, not representing the current Finnish ILTC population.

Staff-related implementation enablers and barriers included the staff's attitudes and motivation, learning and working as a team, time and schedules, and management (Table 8). For example, negative attitudes and lack of motivation by the staff impeded physical activity delivery, whereas learning and working as a team, and managerial support facilitated increasing older adults' physical activity. Based on the review of literature, there is a need for further research to explore how physical activity promotion can be comprehensively improved as nursing practice, in collaboration with the nurses themselves (Table 9).

Table 7. Effects of outcomes measured in experimental studies.

Physical activity	**Outcomes**					
Group exercise	**Mobility**	**Cognitive func.**	**ADL func.**	**Mental health**	**Quality of Life**	**Other outcomes**
Chen et al., 2015						
Chen et al., 2021						
Morris et al., 1999						
Su et al., 2022						
Sit-to-stand activity						
Grönstedt et al., 2020						
Slaughter & E., 2013						
Slaughter et al., 2015						
Walking						
Rezola-P. et al., 2020						
Yang et al., 2021						
Group activities						
Martichuski et al., 1996						
Dancing						
Bracco et al., 2023						
Activities of daily living						
Henskens et al., 2018						
Kerse et al., 2008						
Morris et al., 1999						
Comprehensive approach						
Hurley et al., 2020						

= measured outcome/s with statistically significant positive effect ($p \leq 0.05$).
= measured outcome/s with no statistically significant positive effect.
Author year = included older adults experiencing on average moderate to severe dementia
ADL = Activities of daily living

Table 8. Staff-related implementation enablers and barriers for promoting older adults' physical activity as nursing practice.

Element	Enabler	Barrier
Staff attitudes and motivation	Openness to work in a new way (Fringer et al., 2015) Willingness to learn (Fringer et al., 2014)	Negative attitudes (Fringer et al., 2014) Reluctance towards change (Forster et al., 2021; Fringer et al., 2014; Vikström et al., 2021) Not perceiving activity promotion as a part of one's role, necessary in older adults' daily life, or as a part of care routines (Forster et al., 2021) Worries about resident safety (Fringer et al., 2014) Gradual loss of motivation (Fringer et al., 2014)
Staff learning and working as a team	Education and training for staff (Blindheim et al., 2023; Hahn et al., 2024) Learning in a group (Fringer et al., 2014) Shared understanding (Forster et al., 2021) Good communication (Fringer et al., 2014) Positive team spirit (Fringer et al., 2014) Working towards shared goals in a structure way (Forster et al., 2021)	
Time and schedules	Embedding new activities in weekly plans (Forster et al., 2021) and daily routines (Vikström et al., 2021) Long-term work to achieve permanent changes (Vikström et al., 2021)	Lack of time (Fringer et al., 2014) Feeling overworked (Forster et al., 2021; Fringer et al., 2014; Vikström et al., 2021) Rigid organizational routines (Forster et al., 2021)
Management	Managerial support (Forster et al., 2021; Fringer et al., 2014; Hahn et al., 2024; Vikström et al., 2021)	Leaders not perceiving improving physical activity promotion necessary (Forster et al., 2021) Simultaneous other contextual processes (Forster et al., 2021)

Table 9. Summary of review of literature for the domain of practice.

Domain of practice – Summary
• Nursing practices and interventions promoting older adults' physical activity in ILTC relate to basic care situations and delivering physical activities for older adults. • Most studies promoting older adults' physical activity have included heterogenous populations, used heterogenous single-type activities and outcomes, limiting assessing effectiveness. • Staff's attitudes and motivation, learning and working as a team, time and schedules, and management may impede or enable intervening on older adults' physical activity as nursing practice. **There are various opportunities to promote older adults' physical activity as nursing practice but more research is needed to increase evidence. Limited research has been conducted with a comprehensive focus on physical activity throughout daily life and involving nurses themselves in developing physical activity promotion. To respond to these observations, this study will take a comprehensive focus on, and explore, promoting older adults' physical activity as nursing practice in ILTC collaboratively with nurses.**

2.2.3 Environment related to older adults' physical activity in institutional long-term care

As the study generates insights on promoting older adults' physical activity using the environment, previous literature on the environmental elements related to older adults' physical activity were reviewed, synthesizing physical, social, and symbolic environmental enablers and barriers for older adults' physical activity (search 2). Additionally, the findings on environmental elements used in studies promoting older adults' physical activity as nursing practice were synthesized (Search 1).

There is increasing research interest in the environment related to older adults' physical activity in ILTC. This can be stated based on Paper I, in which, most included studies (n=21) had been published in 2010 or after, and on the updated review, which identified 12 studies from the last four years. Environmental elements are not, however, largely or comprehensively used in most studies promoting older adults' physical activity as nursing practice.

Physical, social, and symbolic environmental enablers and barriers for older adults' physical activity

Various elements in the physical, social, and symbolic dimensions of the environment, were identified to relate to older adults' physical activity in ILTC (Table 10). These were similar to those reported in Paper I.

Table 10. Environmental enablers and barriers for older adults' physical activity identified from review of literature.

Element	Enabler	Barrier
Physical environment		
Natural and built outdoor environment	Access to outdoor spaces (Altmeier et al., 2021; Griffiths et al., 2024; Lee et al., 2021; Liljegren et al., 2024; Portegijs et al., 2022a; Rosteius et al., 2022) Proximity to nature (Liljegren et al., 2024) Proximity to parks and services (Lee et al., 2021; Liljegren et al., 2024) Wide enough walking paths (Liljegren et al., 2024; Roberts, 2023) Appropriate spaces for group activities (Liljegren et al., 2024)	Longer distance to outdoor spaces (Liljegren et al., 2024) Slopes, noisiness and gravel (Liljegren et al., 2024)
Indoor environment	Architectural choices enabling incorporating everyday tasks as a part of residents' lives (Roberts, 2023; Rosteius et al., 2022) Access to multiple lounges (Griffiths et al., 2024) Appropriate spaces for group activities (Burke et al., 2021; Portegijs et al., 2022a) Spaciousness (Griffiths et al., 2024) Sufficient walking space (Portegijs et al., 2022b) Wide, long corridors (Altmeier et al., 2021; Griffiths et al., 2024) Even walking surfaces (Liljegren et al., 2024) No thresholds (Altmeier et al., 2021; Liljegren et al., 2024) Contrasts in colors in corridors (Griffiths et al., 2024) Automatic doors and wide enough doorways (Liljegren et al., 2024) Signage for wayfinding (Griffiths et al., 2024) Good lightning (Griffiths et al., 2024) Points of interest to attract attention (Griffiths et al., 2024) Sensory points of interest (Griffiths et al., 2024; Portegijs et al., 2022a)	Limited space in common areas and closed spaces (Altmeier et al., 2021) Too narrow walking paths (Liljegren et al., 2024) Obstacles in corridors like laundry boxed (Altmeier et al., 2021) Long corridors with dead ends (Lee et al., 2021) Longer distance to activity spaces (Mauldin et al., 2021)
Furnishing	Available chairs and seating (Griffiths et al., 2024; Liljegren et al., 2024; Portegijs et al., 2022a)	
Aids and equipment	Well-working mobility aids and lifts (Altmeier et al., 2021; Liljegren et al., 2024; Portegijs et al., 2022a) Good rails (Griffiths et al., 2024; Liljegren et al., 2024) Available exercise equipment (Liljegren et al., 2024) Exergames like interactive mats (Chu et al., 2021)	

Element	Enabler	Barrier
Social environment		
Residents	Interaction between residents (Burke et al., 2021)	
Family	Participation in care decision making (Rosteius et al., 2022) Participation in delivering activities (Portegijs et al., 2022b)	
Community	Volunteers (Roberts, 2023), medical clowns and pets (Altmeier et al., 2021) participating in organizing activities	
Symbolic environment		
Care culture	Positive care culture and attitudes towards movement and wandering (Griffiths et al., 2024) Underlying values to enable free movement between indoor and outdoor spaces and the wider outdoor and built environment (Roberts, 2023; Rosteius et al., 2022) Underlying values promoting independence in everyday activities (Roberts, 2023; Rosteius et al., 2022)	Prioritizing safety over movement (Portegijs et al., 2022b) Using restraints (Portegijs et al., 2022b)

The elements in the physical environment were important to enable and stimulate older adults' physical activity, relating to the natural and built outdoor environment, indoor environment, furnishing, and different aids and equipment at use in the LTC facilities. In the social environment other residents in the unit, family members, and the wider community were identified as being able to enable older adults' physical activity. In the social environment, care culture could both enable and impede physical activity.

Environmental elements used in studies promoting older adults' physical activity as nursing practice

Considering the **physical environment**, in the studies implementing exercise, **equipment** was used, including weights (Henskens et al., 2018; Morris et al., 1999; Rezola-Pardo et al., 2020; Yang et al., 2021), elastic bands (Chen et al., 2015; Su et al., 2022), gymnastic sticks, soft balls, and everyday objects such as towels (Kruse et al., 2021). In Hahn et al. (2024), **small changes to the physical environment** were made to stimulate physical activity, such as creating barefoot trails and furnishing balconies. **Technology** was employed in one study, as exercise was delivered using a semi-humanoid robot by nursing staff. This activity was found enjoyable by older adults and staff but long-term use was perceived to still possess challenges and raise concerns about dignified care. (Blindheim et al., 2023) In two studies, **assessments of the physical and organizational environments** were conducted, and **subsequent modifications** were planned, however, not clearly reported in the studies (Forster et al., 2021; Hurley et al., 2020).

The **social environment** was used in four studies. In Hahn et al. (2024), **engaging neighborhoods and volunteers** was used as a strategy to provide more activities to older adults without additional staff resources. In other studies, **family members** and volunteers were involved in delivering activities, such as exercise (Chen et al., 2015; Morris et al., 1999) and walking (Rezola-Pardo et al., 2020) for older adults.

The symbolic environment was addressed in two studies. Challenging organizational and individual attitudes (Hurley et al., 2020), and changing care culture by collaboration of staff (Forster et al., 2021) were used as strategies to achieve change in physical activity promotion. Based on the review of literature, more research is needed exploring the use of the environment as an important component in the promotion of the physical activity of older adults in ILTC (Table 11).

Table 11. Summary of review of literature for the domain of environment.

Domain of environment – Summary
• Various elements in all the dimensions of the environment relate to older adults' physical activity, enabling and impeding physical activity. • Environmental elements have been employed to a limited extent in studies intervening on older adults' physical activity as nursing practice. **Even though the environment relates to older adults' physical activity in various ways, it has been employed in physical activity promotion efforts to a limited extent in ILTC. To respond to these observations, this study will take a comprehensive focus on, and explore, the environment and using it as an important component in the promotion of the physical activity of older adults in ILTC.**

2.3 Research gaps and justifications for the study

There is a vital need to improve older adults' physical activity promotion in ILTC, based on recurrent international evidence on the low levels of physical activity of older adults (den Ouden et al., 2015; Hahn et al., 2023; Liu et al., 2020; Mc Ardle et al., 2021; Parry et al., 2019) and the lack of activities engaged in by older adults (den Ouden et al., 2015; Hahn et al., 2023; Mc Ardle et al., 2021). Even small increases in physical activity could have various benefits for older adults who are able to engage in physical activity (Warburton & Bredin, 2017). For older adults with advanced deterioration in health and functioning (Edgren et al., 2024b) the role of professionals and the role of suitable environments are vital to engage in physical activity. Because of these factors a **comprehensive examination of older adults' physical activity promotion is warranted** to produce improvements.

Regarding professionals, the work of nurses is at the focus of this study, due to the importance of nursing in the ILTC context. Traditionally physical activity promotion has been the responsibility of rehabilitation professionals (Baert et al., 2016), but rehabilitation resources in this setting are scarce (Kehusmaa & Alastalo, 2021). Moreover, due to deterioration in health and functioning, **older adults rely on the support of nurses to meet their basic needs** (Saske et al., 2025), including moving and engaging in physical activities in daily life (Henderson, 1978). So far, research about nursing practices for older adults' physical activity promotion has addressed the topic in a somewhat compartmentalized manner (Bowes et al., 2022), for example, examining physical activity promotion in basic care activities or delivering single-type physical activities. Despite the aim of nursing care being to provide comprehensive care (Henderson, 1978), there is a **lack of research addressing the topic of physical activity promotion as nursing practice with a comprehensive focus** on physical activity as a basic need in everyday life; therefore integrating physical activity needs to be introduced into different kinds of everyday

activities. Consequently, more research is needed that has a comprehensive focus on, and an exploration of, promoting older adults' physical activity as nursing practice and improving physical activity promotion. To do so, the **participation of nurses in examining and developing their own practices is vital**. This is further highlighted by the fact that staff engagement, motivation, resources, managerial support (Forster et al., 2021; Fringer et al., 2014; Vikström et al., 2021), and challenging current care cultures (Forster et al., 2021; Hurley et al., 2020) are vital for the success of improved physical activity promotion. Therefore, this study explores the promotion of the physical activity of older adults together with nurses and other professionals in ILTC.

With regard to the environment, internationally and in Finland, **promoting older adults' physical activity by activating environments is an important strategy** for active and healthy ageing (Ministry of Social Affairs and Health, 2020; World Health Organization, 2020a). However, there seems to be a lack of implementing these policies in the ILTC setting. This can be evidenced in the review of the literature, which shows that various elements in all dimensions of the environment relate to older adults' physical activity in ILTC, but the **ILTC environment has been employed in physical activity promotion efforts to a limited extent**. In this context especially, the role of the environment is of particular importance due to the advanced deterioration in functioning older adults experience (Lawton, 1989; Lawton & Nahemow, 1973). If not considered, the **lack of an appropriate environment may lead to passivity**. For improvements, more research is needed that has a comprehensive focus on the environment and using the environment as an important component in the promotion of the physical activity of older adults in ILTC. **Developing activating environments requires the involvement of older adults** and staff members who live and work in these environments. Furthermore, older adults have a legal right to participate in the development of the services they need (Act on Supporting the Functional Capacity of the Older Population and on Social and Health Services for Older Persons 980/2012). This also includes family members of the individuals with advanced functional decline facilitating and giving a voice to the older adults (Hovenga et al., 2024). Therefore, this study explores the promotion of the physical activity of older adults together with older adults and their family members in ILTC.

Moreover, **In Finland,** mobility and physical activity are **one of the most often neglected care needs** (Kangasniemi et al., 2022) and older adults do not receive sufficient rehabilitative care (Edgren, 2021). However, there is a **lack of research on older adults' physical activity and its promotion**, as evidenced by the scarcity of any identified studies from Finland in the review of the literature. Therefore, this study explores physical activity promotion in the context of Finnish ILTC. Producing rich contextual knowledge, the produced findings may be used to encourage further research, policy, and practice in the Finnish and international contexts.

3 Aims

The aim of the study was to produce a comprehensive understanding of older adults' physical activity promotion in ILTC as nursing practice using the environment. With a participatory approach, the study generated insights collaboratively and synthesized findings in three phases: exploring older adults' physical activity (Phases II, III; Paper II, III, IV), physical activity promotion (Phases I, II, III; Papers I, II, III, IV), and the environment related to older adults' physical activity (Phases I, II, III; Papers I, II, III, IV) in ILTC. In Phase IV, in the summary, the findings of the other three phases and the four papers were synthesized to develop a metaphorical model (Figure 4) using the following research question:

How can older adults' physical activity be promoted in institutional long-term care as nursing practice using the environment?

To conduct the synthesis, three sub-questions were used, each corresponding to one of the theoretical domains of nursing at the focus of the research: client, practice, and environment:

1. How and how much are older adults physically active in institutional long-term care (Phase II, III; Papers II, III, IV; domain of client)?
2. How and by whom is physical activity promoted in institutional long-term care (Phase I, II, III, Papers I, II, III, IV; domain of practice)?
3. How does the environment relate to older adults' physical activity in institutional long-term care (Phase I, II, III; Papers I, II, III, IV; domain of environment)?

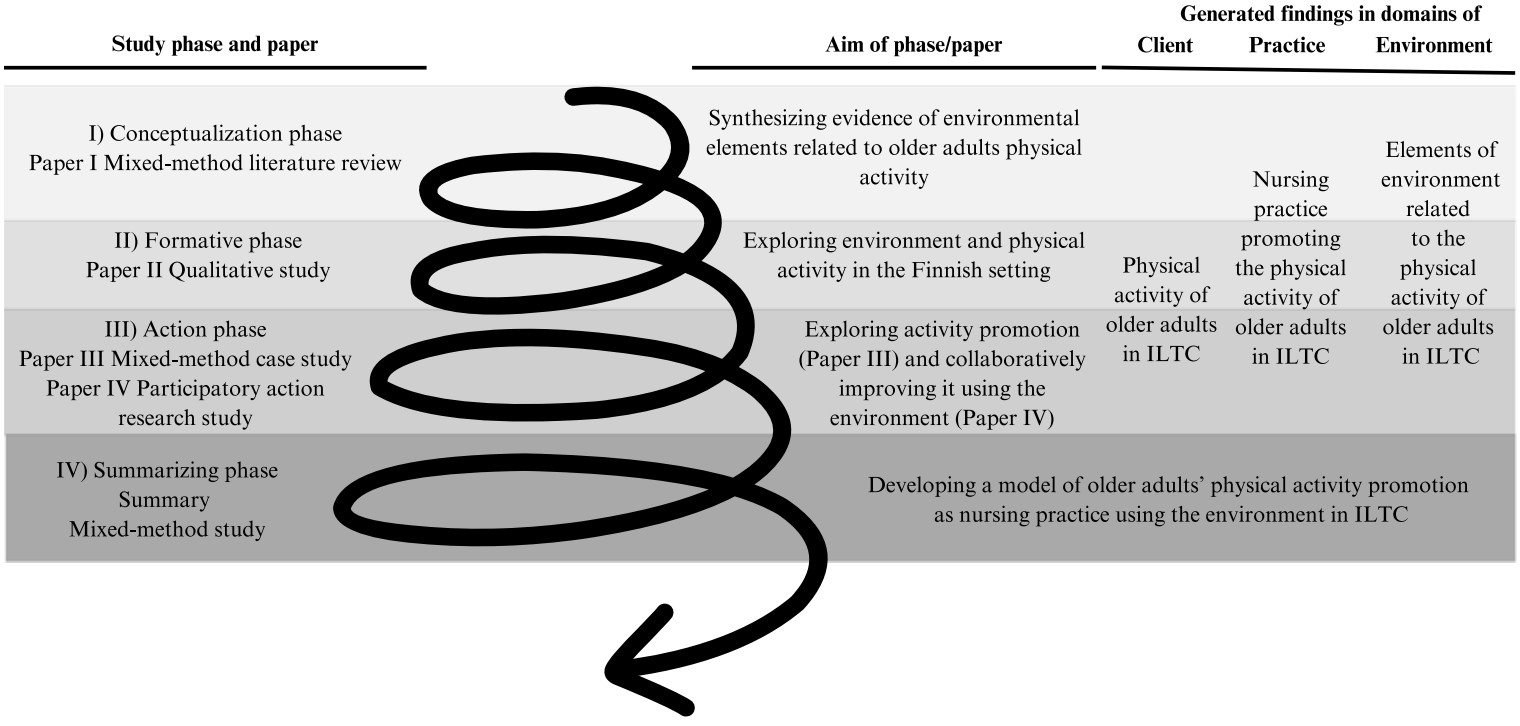

Figure 4. Cyclical research process. The process is presented from the top down. One cycle represents one phase in the study. The cycle as a whole depicts the iterative nature of the study and the use of the produced knowledge in the following phases. Widening of the cycles represents widening the focus of the research as understanding of the topic increased with the progress of the study.

4 Materials and Methods

In this chapter the materials and methods used to conduct the study will be presented. First, in Chapter 4.1 the methodological approach and design of sub-studies will be presented. In Chapter 4.2 the following will be presented: the methods of the sub-studies including settings and participants (Chapter 4.2.1), data collection (4.2.2), and data analyses (4.2.3). Finally, in Chapter 4.3 a presentation is given as regards a summary synthesis answering the research questions and sub-questions of the study.

4.1 Methodological approach and study designs

The study was conducted as a mixed-method study with four phases, reported as four papers and the summary. The phases of the study included: I) Conceptualization phase (Paper I), II) Formative phase (Paper II), III) Action phase (Paper III, IV), and IV) Summarizing phase (Summary) (Figure 4). A convergent mixed-method design (Creswell & Plano Clark, 2018, p. 68) was used (Table 12). There was an emphasis on qualitative or qualitized data but by also using quantitative data a richer understanding of the research topic was gained.

The philosophical orientation of the study was pragmatism. Pragmatism is a theoretical stance that emphasizes researching real-world problems for the purpose of producing practice- and action-oriented knowledge (Allemang et al., 2022). The focus in pragmatist research is on the research question rather than the methods or worldviews underlying them (Creswell & Plano Clark, 2018, pp. 37–39). As this theoretical stance does not position itself to either the positivist or interpretive paradigms, pragmatisms allows the use of both qualitative and quantitative methods to produce knowledge on a topic (Johnson et al., 2007). Furthermore, in Phases II (Paper II) and III (Paper IV), the research work was guided by critical theory, viewing research and theory as instruments for enacting change (Patton, 2015, p. 692; Wang & Burris, 1994) and acknowledging societal power structures as important in the production of knowledge (Jacobs, 2018).

Table 12. Integration of qualitative and quantitative data in the study.

Phase	Study		Mixed-method design	Mixed-method integration
I	I	Systematic mixed-method literature review	Convergent	Merging (Creswell & Plano Clark, 2018, pp. 69–70)
II	II	Qualitative photo-elicitation study	Not applicable	Not applicable
III	III	Mixed-method case study	Convergent	Threading (Moran-Ellis et al., 2006)
	IV	Participatory action research study using qualitative and quantitative data	Convergent	Merging (Creswell & Plano Clark, 2018, pp. 69–70)
IV	Summary	Mixed-method study	Convergent	Merging (Creswell & Plano Clark, 2018, pp. 69–70)

The mixed-method research process was iterative in nature. The findings of phases I-III informed all subsequent phases and the summary synthesis in Phase IV, building up insights about the research topic (Figure 4).

In Phase I, the conceptualization phase of the study, a systematic mixed-method literature review (Paper I) was conducted to explore and synthesize findings on the topic of the environment for older adults' physical activity in the context of ILTC. In the scientific literature, no previous reviews synthesizing evidence with the focus on environmental elements in all of the dimensions of the environment was identified. Therefore, the literature review was conducted with the aim of creating a comprehensive understanding about elements in the dimensions of physical, social, and symbolic environment enabling and impeding the physical activity of older adults.

Evidence of quantitative, qualitative, and mixed-methods studies was integrated with a convergent approach, following the Guidance for Narrative Synthesis in Systematic Reviews by Popay and colleagues (2006). The findings of Phase I, were used to conceptualize the environment related to older adults' physical activity in ILTC. Furthermore, the findings of Phase I, were used to inform data collection, for example, producing interview guides, and collaborative work with participants in the subsequent phases.

In Phase II, the formative phase of the study, a qualitative photo-elicitation study (Paper II) was conducted to understand the topic of environment for older adults' physical activity in the context of Finnish ILTC. In the literature review, no studies from the Finnish context were identified. Therefore, it was important to

understand the current environment for older adults' physical activity in the Finnish care context. Furthermore, the aim was to produce insights about solutions to improve the environment for increasing older adults' physical activity from the perspectives of older adults and nurses living and working in Finnish ILTC settings. The findings of Phase II were used together with the findings of Phase I to guide evidence-informed development in co-producing changes to increase older adults' physical activity, for example providing information to staff members in workshops, and inform data collection in Phase III.

In Phase III, the action phase, a participatory action research study was conducted. The aim was to produce change using research as a tool to improve activity promotion (Lewin, 1946), at the same time learning by doing (O'Brien, 2001). This meant generating findings on increasing older adults' physical activity by investigating the collaborative change process. The study was reported in two papers, **including a mixed-method case study (Paper III), and a participatory action research study** using qualitative and quantitative data **(Paper IV).**

In Phase IV, in the summary, findings of the Phases I-III, including sub-studies I-IV, were synthesized answering the research question and sub-questions of the study. To do so, qualitative and quantitative findings of the sub-studies I-IV were merged using a narrative in the findings section of the study (Creswell & Plano Clark, 2018, p. 226) and by developing a graphical presentation of the results (Davies et al., 2022, pp. 13–19).

Within the iterative research process, being in line with conducting exploratory research, the focus and research question of the study evolved (Agee, 2009). The study started with a focus on the domain of environment for older adults' physical activity promotion. In Phase I (Paper I), staff members in ILTC were conceptualized as a part of the social environment. This decision was made identifying the importance of staff members as a part of the social environment of older adults in ILTC (Gebhard et al., 2024), and informed by previous research on the topic of environment for older adults' activity in LTC (Nordin et al., 2017). However, as the study progressed, the importance of nursing was emphasized in the promotion of older adults' physical activity using the environment. Therefore, to provide a more comprehensive understanding on the topic, the research focus and question were broadened. For consistency with the theoretical basis of the study, nurses and their work were then examined within the domain of practice (Kim, 2010, pp. 78–79).

4.2 Methods of sub-studies

The study was conducted exploring the perspectives of older adults, their family members, and staff working in ILTC, using various qualitative data collection methods. Furthermore, these findings were integrated with those produced with

quantitative methods, for example, measurements of older adults' physical activity levels, and with findings from the systematic review (Table 13). The methods will be described in the following sub-chapters and further details can be found in Papers I-IV.

4.2.1 Settings and participants

Phase I

In the systematic review, studies were included if they had been conducted in the setting of LTC services for older adults. These were defined as including nursing homes, assisted living communities, residential communities, and retirement communities. A broader focus on the LTC context (not including only ILTC settings) was used than in Phases II-III. This was done to include as many relevant studies as possible in order to gain an understanding of the environmental elements relating to the physical activity of older adults living in an LTC setting. A broader inclusion criterion was also used for older adults than in the other sub-studies. In the review, studies were included, if they had investigated the physical activity of older adults aged sixty years and above. The age limit of sixty years was used as in initial searches it was observed that some relevant studies would be excluded using the age limit of 65.

Phase II

The study was conducted in the context of Finnish ILTC. Purposeful sampling (Patton, 2015, pp. 52–52) was used in recruitment. The aim of the recruitment was to include different kinds of ILTC environments and participants having different perspectives. Four units from Southern Finland were recruited to participate. All units organized ILTC for older adults in closed units. Two units had been built in the last five years. The other two units had been built in the 1960s and 1970s and it was more than 10 years since their last renovation. Participants included older adults and staff members living and working in the unit. Eligibility criteria for older adults required them to be at least 65 years old, have resided in the unit for a minimum of six months, and be deemed capable of providing informed consent by staff. Staff members qualified for participation if they had been employed in the unit for at least six months, worked at least 50% of full-time hours, and were actively involved in residents' daily care. Three older adults and three staff members were recruited from each unit. The final sample included twelve nurses, of whom four participated in the group discussion. Twelve older adults were recruited but two later declined participation, therefore, the final sample included ten older adults (Table 14).

Table 13. Methods used in Phases I-IV.

Phase	I, Conceptualization Phase	II, Formative phase	III, Action phase		IV, Summarizing phase
Substudy, Paper	Systematic review, Paper I	Photo elicitation study, Paper II	Case study, Paper III	Participatory action research study, Paper IV	Summary
Design	Systematic mixed-method literature review	Qualitative study	Mixed-method case study	Participatory action research study	Convergent mixed-method study
Setting	Institutional long-term care of older adults aged 60 and older	Four institutional long-term care units of older adults aged 65 and older	One institutional long-term care unit of older adults aged 65 and older		Institutional long-term care of older adults
Sample	Scientific peer-reviewed empirical research articles (n=30)	Purposeful sample of 12 staff members and 10 older adults	Self-selected sample of 12 staff members and 13 older adults	Self-selected sample of 18 staff members, 17 older adults, and 6 family members	Papers I-IV
Data collection	Systematic literature searches in PubMed, CINAHL, Cochrane library, and PsycInfo from inception until December 31st 2020 according to predefined eligibility criteria	Staff: individual photographing (n=12) and a subsequent group discussion (n=4) Older adults: individual discussions and photographing (n=10)	Accelerometers, interviews, focus groups, patient record transcripts	Observations, interviews, focus groups, workshops, steering group and staff meetings, accelerometers, questionnaires, record keeping, patient record transcripts	Findings of Papers I-IV
Data analysis	Abductive thematic analysis	Reflexive thematic analysis	Following a thread: reflexive thematic analysis, descriptive statistics	Reflexive thematic analysis, descriptive statistics, student's T-Test	Reflexive thematic analysis
Timeline	2021	2022-2023	2023-2025		2025

Phase III

The participatory action research study, corresponding to Sub-studies III and IV, was conducted in the Finnish ILTC context. One ILTC unit interested in developing their practices using the environment to increase older adults' physical activity was purposefully recruited (Patton, 2015, pp. 52–53). Private and public sector units were approached. One public sector unit was selected to participate. The unit was located in a larger facility of several ILTC units and other care services for older adults. The participating unit consisted of two group homes on the same floor. Both group homes had their own common areas for residents. However, residents could spend time in both group homes and used, for example, the same sauna and balcony. Staff members were stationed in the unit as a whole and working in both group homes. Staff members consisted of nursing assistants, practical nurses, registered nurses, an occupational therapist, a physiotherapist, and two head nurses. Care was provided by 12 nursing staff members (including nursing assistants, practical nurses, and registered nurses) daily. The physical therapist worked in the unit five days a week and the occupational therapist one day a week. In addition, the facilities employed cultural instructors and social workers whose allocated work time in the unit was approximately three days a week. Altogether 25 older adults lived in the ILTC unit.

The final sample was self-selected by everyone living and working in the unit, and the older adults' family members. Altogether, 41 individuals were involved in the study, of which 17 were older adults, 6 were their family members, and 18 were staff members. These participants formed the sample of the participatory action research study (Table 14). In the case study, a sub-sample of all participants was included. Inclusion was based on having participated in the data collection used in the case study. Thirteen older adults and twelve staff members participated (Table 14).

Table 14. Characteristics of study participants.

	Phase II		Phase III		
Participants (sample)	Older adults (n=10)	Staff members (n=12)	Older adults (n=17) (n=13)*	Staff members (n=18) (n=12)*	Family members (n=6)
Women, %	70	82	59 62*	94 100*	33
Age, mean (range)	82 (67-92)	40 (21-58)	83 (65-102) 84 (65-102)*	43 (21-66) 40 (21-53)*	73 (70-78)
Walks independently with/-out aid, %	40		47.1 61.5*		
Walks with aid supported by nurse, %	30		17.6 15.4*		
Moves independently with wheelchair, %	30		11.8 15.4*		
Moves passively with wheelchair, %			23.5 7.7*		
Practical nurse		8		9 6*	
Registered nurse		3		2 2*	
Nursing aid				2	
Occupational or physiotherapist				2 2*	
Social worker				1	
Head nurse				2 2*	

* = sub-sample of participants included in case study (Paper III)

4.2.2 Data collection

Phase I

In the systematic literature review, systematic searches in four international scientific databases –PubMed (MEDLINE), Cumulative Index of Nursing and Allied Health Literature (CINAHL), PsycInfo, and the Cochrane Library – were conducted from the earliest available records up to December 31, 2020 (Paper I), and updated up to March 31, 2025 (summary). The search terms included the concepts of physical activity, environment, older adult, and LTC setting and relevant synonyms,

identified from previous literature. The searches were conducted at the title and abstract level and restricted to English-language publications. Additionally, reference lists of included studies were reviewed to complement the search. The eligibility of studies was assessed using a predefined SPIDER criterion that can be used as a search strategy tool in mixed-method research (Cooke et al., 2021). For the included studies, information from the results and discussions of the articles were extracted concerning the relationship between physical activity and environment.

Phase II

Photo-elicitation (Collier, 1957) was used to collect data. As a method it provides a means to capture and reflect on the studied environment (Collier, 1957), and has been successfully employed by scholars to investigate elements in multiple dimensions of the environment (Novek et al., 2012). It combines the use of photographs taken by participants or researchers which are incorporated into individual or group discussions (Collier, 1957; Phillipson & Hammond, 2018). Different approaches were used with older adults and nurses.

For older adults, individual interviews were conducted. This approach was used to involve as many older adults as possible, most experiencing advanced decline in cognitive or physical functioning. Older adults were asked to reflect out loud about their physical activity in the ILTC setting and external elements impeding and enabling it. Photographs were taken based on their accounts and instructions. Based on elements of the environment identified in Phase I and earlier research (Benjamin et al., 2014), the older adults were asked probing questions. They were also asked to identify what could be changed in the environment to better promote their physical activity. They were encouraged to move around within the facility to prompt discussions about the environment, and some chose to do so. The duration of data collection sessions ranged from 21 to 65 minutes. All sessions were recorded, and the discussions were used as data. Additionally, field notes were taken about the facility characteristics during data collection to support the data analysis process.

For the data collection with staff members, the staff themselves took photographs in the facilities. They were instructed to take a maximum of ten photographs of environmental barriers and enablers regarding the older adults' physical activity, note the three most important photographs, and give titles to the photographs on a form prepared for this purpose. Subsequently they were invited to a group discussion where their pictures were presented to all participants and discussed together. For this purpose, a slide show was prepared to present the pictures. In each slide, similar pictures were presented. The pictures shown were selected to include the pictures nurses had identified as the most important, and to include as many topics as possible. The nurses were instructed to discuss the environmental elements in the pictures, if they were barriers or enablers of physical activity, and how the

environment could be improved or enablers better employed to improve older adults' physical activity. The group discussion lasted for two hours, was recorded, and used as data. Nurses participated in data collection during their work time.

Phase III

In Phase III, a participatory action research (Kemmis, 2014) study was conducted, reported as two sub-studies (Paper III, IV). The study aimed to improve the promotion of older adults' physical activity by co-developing, implementing, and evaluating changes in the care and care environment in one ILTC unit together with staff members, older adults, and their family members. In Paper III, a subset of data collected before the implementation of changes was used, whereas Paper IV reported the participatory action research study as a whole. Therefore, the overall data collection is described first.

In the participatory action research study, one action research cycle was conducted, including observation, plan, action, and evaluation phases (Kemmis, 2014, p. 18). First, in the observation phase the current situation and participants' needs and wishes were assessed. Second, in the plan phase, based on the identified needs and priorities, solutions to increase older adults' physical activity were ideated. Based on the ideated solutions a vote by the participants to select strategies to implement an activity promotion was organized. Third, in the action phase, the participants implemented and monitored the selected strategies. Fourth, in the evaluation phase, the selected strategies and the research process were evaluated. The process was not linear as the phases were partly conducted iteratively or through overlapping. For example, for the purpose of evaluation, measurements were conducted of older adults' physical activity before and after the implementation of the changes.

A formal steering group of participants was formed to collaboratively make decisions about the research process. A staff member from each sub-group of professionals participated in the steering group meetings, for nursing professionals several could participate. The plan was to also include an older adult and a family member, but no capable and interested individuals were identified. The steering group met seven times during the study. In addition, the study process and progress were discussed in staff meetings (n=7). Discussions and decisions were documented in the form of notes, memos, or other materials, which were used as data.

Figure 5. Data collection during Phase III (Modified from Paper IV).

Primarily qualitative data collection methods were used, since the study centered on participants' perspectives, experiences, and collaborative efforts for change (Dedding et al., 2022) (Figure 5). Observations were used with older adults and staff members to understand the daily life of older adults, and the routines, practices, and the environment in the unit. Furthermore, this built relationships and trust between the participants and researchers (International Collaboration of Participatory Health Research [ICPHR], 2022). With older adults, observations were complemented with engaging in activities and discussion with the older adults (Phillipson & Hammond, 2018). This approach was used to involve older adults with varying amounts of deterioration in cognitive functioning, to understand their perspectives of, and wishes and needs for their physical activity. The observations were recorded as field notes.

With staff and family members, interviews (Patton, 2015, p. 426) and focus groups (Patton, 2015, pp. 475–479) were used. Nursing staff and family members participated in the focus groups. Other staff members participated in individual interviews as there were not enough of the same professionals to form professional-specific groups. This approach was selected for the participants to openly share their viewpoints and due to having different roles in the activity promotion of older adults and in the study. In the observation phase, a semi-structured interview guide (Patton, 2015, p. 439) was used, that was developed based on earlier research (Paper I, II) and finalized together with participants in the steering group of the study. In the evaluation phase, the interview guide was developed in the steering group to reflect what had been done during the study. The interviews and focus groups were recorded and transcribed verbatim. The interviews lasted between 1.5 hours and 2.5 hours.

For planning, workshops with staff members were held. Creative methods, such as vision board creation were used (Groot & Abma, 2022), and facilitated discussions to encourage ideation. As a part of evaluation, an anonymous questionnaire was administered to explore staff members' perspectives on the research process and what had been done. Throughout the study, informal feedback from participants was gathered by academic researchers and participants. Field notes to document the process (Patton, 2015, p. 387-389) and a reflexive diary to support reflexive practice were kept (Walsh, 2003).

Quantitative data were collected in the evaluate phase to assess changes in outcomes before and after the co-produced changes, including older adults (n=13) and staff members (n=12) (Table 15). Accelerometers were worn by participants for seven consecutive days. Patient record transcripts of older adults (n=13) considering their physical activity were retrieved for the same seven-day periods during pre- and post-measurements. This was done to assess other possible changes in physical activity delivery than the co-produced changes. Pre- and post-measurement were conducted 16 weeks apart, first measurements being done in October 2023. In addition, throughout implementation, nurses kept records of delivering co-produced physical activities of the older adults, noting down the organizers, participants, and content of the activities.

In the case study (Paper III), some of the data collected in the action research study described above were used to investigate physical activity promotion in the unit before implementation of the co-produced changes (Figure 6). These data included: 1) individual interviews with physiotherapists, occupational therapists, head nurses (n=4), and one focus group with nurses (n=8) collected in the observation phase, and 2) accelerometer and patient record transcript data of 13 older adults collected in the evaluation phase before the implementation of changes (pre-measurements).

Table 15. Quantitative data collection in Phase III.

Outcome	Data collection method	Participants (in pre- and post-measurements)
Physical activity	Fibion SENS Motion activity tracking system (Fibion Inc., 2020) worn on the thigh	Older adults (n=12)
Time spent lying down	Fibion SENS Motion activity tracking system (Fibion Inc., 2020) worn on the back	Older adults (n=13)
Life-space	Nursing Home Life-Space Diameter instrument (Tinetti & Ginter, 1990)	Older adults (n=13)
Quality of life	World Health Organization Quality of Life (WHOQOL - BREF) instrument (Vaarama et al., 2014)	Older adults (n=7)
Person-centred care	Person-Centered Climate Questionnaire (Edvardsson et al., 2015)	Older adults (n=5) Staff (n=10)

4.2.3 Data analysis

Phase I

To analyze data of the systematic review, the abductive thematic analysis approach by Thomas and Harden (2008) was used. The study findings were thoroughly reviewed and coded using NVivo (version 12.6.0.959). As part of this process, quantitative data was transformed into qualitative insights by developing narrative interpretations of the numerical results and applying relevant codes. Then codes were thematized deductively into physical, social, and symbolic environment themes based on Kim's theory (2010). Within each theme, codes were examined, and descriptive themes developed inductively.

Phase II & III

In Phases II and III, a qualitative analysis (Paper II) and two mixed-method analyses (Papers III, IV) were conducted. In all of these analysis processes, reflexive thematic analysis (Braun, 2022; Braun & Clarke, 2006) was used to analyze qualitative data. It is an analysis method that can be used with different theoretical assumptions and data. The analysis is conducted as a six-phased process, in which, flexibility is allowed (Braun, 2022; Braun & Clarke, 2006) (Table 16). The analysis process relies on reflexivity and employing the researcher's subjectivity as a tool in the analysis process (Braun & Clarke, 2021).

In the photo-elicitation study (Paper II), reflexive thematic analysis (Braun, 2022; Braun & Clarke, 2006) was used to analyze individual and group discussions, and titles of taken photographs to explore, how the ILTC environment related to older adults' physical activity and how it could be used to increase physical activity. During theme development, the photographs were categorized within the same themes as their titles and related discussion data using a spreadsheet. Rather than coding the photographs separately, they were used alongside the discussion and title data to capture the meanings attributed to them by participants. They served as a tool to enhance and deepen the interpretation of the discussions and titles by cross-referencing the images with the spoken content.

For the mixed-method case study (Paper III), an analysis was conducted using the approach called Following a thread (Moran-Ellis et al., 2006) to explore how older adults' physical activity was promoted, to what extent, and those who were involved in it. The three-step analysis process integrated data produced with qualitative and quantitative methods (Figure 6). Qualitative data was analyzed using reflexive thematic analysis and quantitative data with descriptive statistics (frequencies, means, medians, proportions).

In the participatory action research study (Paper IV), data analyses were conducted as the study progressed through the phases of the action research cycle, to inform actions in subsequent phases. At the end of the research process, a mixed-method analysis was conducted merging findings produced within qualitative and quantitative paradigms (Creswell & Plano Clark, 2018, pp. 69–70) to explore the insights from the study relating to practices, environment and collaboration in improving older adults' physical activity promotion. Qualitative data analysis was conducted with reflexive thematic analysis, and quantitative data was analyzed in SPSS 29.0.0.0 using descriptive statistics (frequencies, mean, medians, ranges) and Student's T-tests. Merging was done in the results section of the research article.

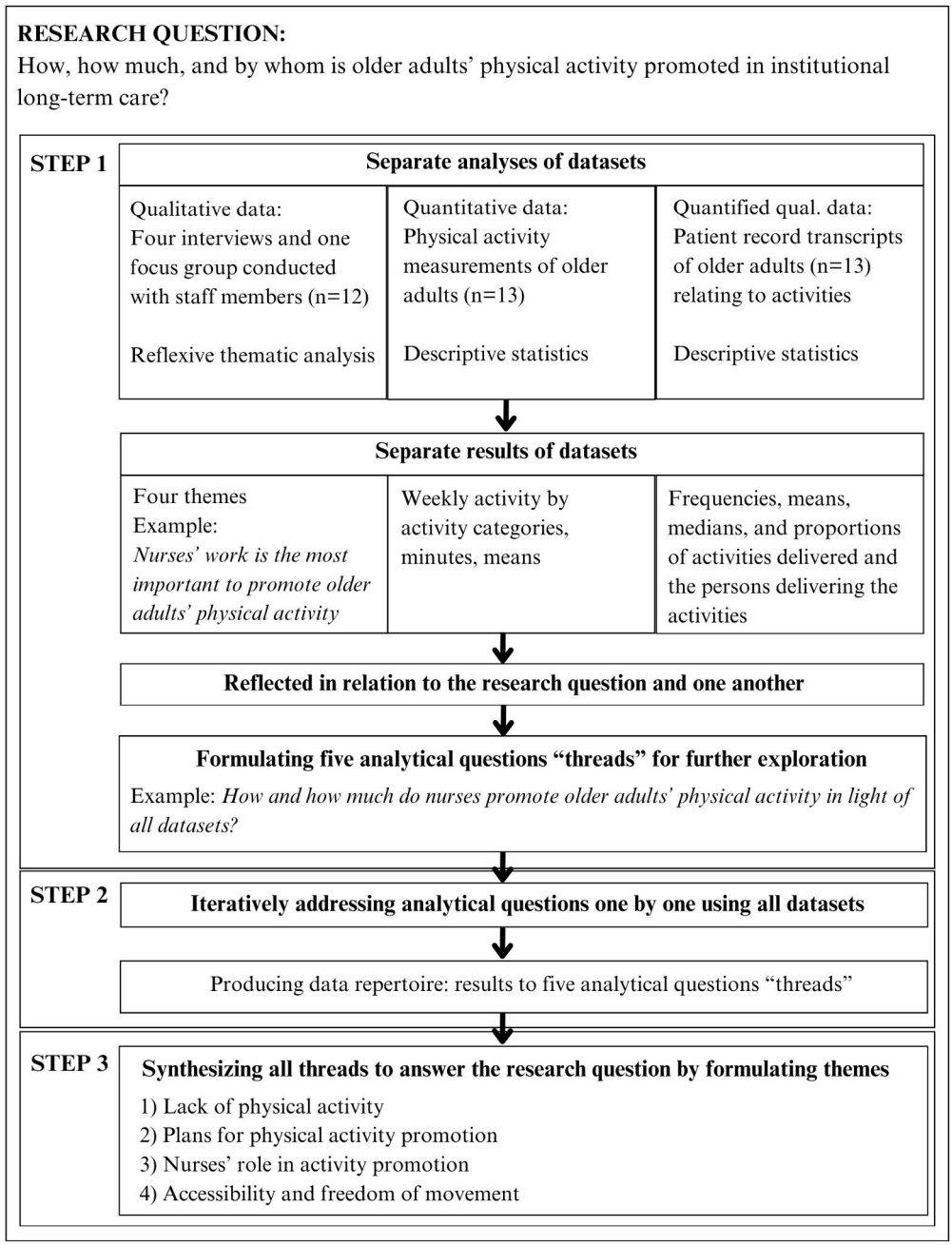

Figure 6. *Following a thread* (Moran- Ellis et al., 2006) analysis process conducted for Sub-study III (Paper III).

Table 16. Reflexive thematic analysis process (Braun, 2022; Braun & Clarke, 2006) and study-specific procedures.

Conducted reflexive thematic analysis (RTA) process			**Study specific procedures**		
Phase of RTA		**Activity**	**Sub-study II**	**Sub-study III**	**Sub-study IV**
1	Familiarizing with dataset	Immersing in data: reading data collection notes, listening to data collection audio recordings, reading data transcriptions	Self-transcribing data verbatim, checking transcriptions		
2	Coding	Coding transcribed data addressing research question, inductive approach, semantic and latent coding	Using an Excel spreadsheet	Using NVivo 1.7.1	Using NVivo 1.7.1
3	Generating initial themes	Organizing codes according to similarities and differences in meaning	Using a Flinga whiteboard	Using a Word file	Using an Excel spreadsheets and Word files
4	Developing and reviewing themes	Developing and reviewing themes against codes and data, looking for an overall story to answer research question, writing initial theme descriptions	Discussing themes with other authors		Member checking of potential themes
5	Refining and naming themes	Developing a detailed analysis for each theme and giving them names		Developing final themes and writing narratives after integration with quantitative data in mixed-method analyses	
6	Writing the report	Writing analytic narrative and contextualizing it with existing literature			

4.3 Summary synthesis

The summary synthesis was conducted in two steps in order to develop a metaphorical model. First, a synthesis was conducted to answer the sub-questions 1-3 of the study. Second, the overall research question of the study was answered. To conduct the synthesis process, the analysis method of reflexive thematic analysis (Braun, 2022; Braun & Clarke, 2006) was followed. Despite being an analysis method for qualitative analysis, the approach was well-suited to conduct the synthesis process, as it is an approach for interpretative qualitative research work, emphasizing the importance of reflexivity as a part of the process, and aims at producing an overall story of the findings (Braun, 2022; Braun & Clarke, 2006).

Furthermore, the analysis method was used in all of the primary research studies (paper II-IV), thus, staying close methodologically to the original research.

First, the sub-questions 1-3 of the study were answered. This was done to synthesize findings representing the three theoretical domains of nursing according to Kim (2010): client (sub-question 1), nursing practice (sub-question 2), and environment (sub-question 3). Following the approach of reflexive thematic analysis (Braun, 2022; Braun & Clarke, 2006), findings from phases I-III (papers I-IV) were integrated by reading the results of the articles (papers I-IV) and extracting all relevant findings to answer each sub-question. Subsequently, for each sub-question, the findings were synthesized according to similarities and differences of the findings related to that question. No coding was conducted to stay as close to the original results as possible.

Second, after having answered the three sub-questions of the study, the findings were reflected on in relation to the overall research question of the study. This meant that the relationships of the different domains: client, practice, and environment came into focus, also considering the ecological model of environment and ageing (Lawton, 1989; Lawton & Nahemow, 1973) of the theoretical framework of the study (see Chapter 2.1, p.13-18). Similar to the process of reflexive thematic analysis (Braun, 2022; Braun & Clarke, 2006), an overall story to answer the research question was looked for. Writing was used as a tool to deepen the answers to the three sub-questions to explain their relations to one another. To stay close to the original results, the original findings of the articles (papers I-IV) were read in the synthesis process and writing the analytic narratives. Furthermore, a graphical presentation of the overall story was built. In the process, creativity was an important tool in finding meaning of the (mostly) qualitative findings (Hunter et al., 2002). Experimenting with different ways to represent the findings graphically, a metaphor was chosen.

Metaphor means using a word or phrase to represent an idea of likeness between two concepts to depict an analogy between them (Merriam-Webster Dictionary, 2025). A metaphor provides a powerful textual image to convey meaning, and can therefore, be used to depict findings of qualitative research (Hunter et al., 2002). In the case of the present study this approach was modified to be used with mixed-method research with an emphasis on qualitative data and findings. Metaphors with textual and graphical representations have been used in nursing science to present the findings of complex phenomenon (Davies et al., 2022, pp. 13–19). This kind of an approach allows the findings to be also approachable for those who should use them in practice (Davies et al., 2022, p. 13). This corresponds to the overall approach of the present study emphasizing practical knowledge. Furthermore, using a creative approach in depicting the synthesis findings corresponds to the methodological choices of the study, i.e., using creative methods to produce knowledge together with

the participants of the study (see Chapter 4.2.2 Data collection, p.47-52). Developing the metaphor, inspiration was drawn from earlier research (e.g. Davies et al., 2022, pp. 13–19), experimenting with different alternatives for the best-fitting metaphor.

4.4 Ethical considerations

Careful consideration of ethics was a vital part of the study throughout the research process. The ethical conduct of the study was ensured by following the Finnish (Finnish National Board on Research Integrity [TENK], 2023) and European (ALLEA, 2023) codes of conduct for research integrity and the ethical principles of research with human participants (TENK, 2019), and those of participatory health research (ICPHR, 2022).

Justification for the research was the identified need to improve the physical activity promotion of older adults in ILTC, considering the current passivity of older adults and lack of approaches focusing on nursing practice using the environment for older adults' physical activity promotion in ILTC. Older adults and nurses were assessed to potentially benefit from the study, and developing the care environment and practices in ILTC to promote older adults' physical activity, outweighed any possible harm of the study.

As a participatory approach to conduct the research was used, the conduct of the study was guided by the ethical principles of participatory health research (ICPHR, 2022). *Mutual respect* for people with different expertise and ways of knowing, and promoting *equality and inclusion* by involving people who often are not involved in research (ICPHR, 2022) guided the involvement of the stakeholders. In the case of ILTC, especially older adults living and staff working there should be involved in research to share their knowledge and experiences (Berge et al., 2022). Considering the population living in the institutional setting, we involved people with dementia, in line with the basic principles of human rights for people with dementia (Dementia Alliance International, 2016), and the framework for qualitative dementia research (Diaz-Gil et al., 2023). To enable their participation, we modified the used data collection methods (Phillipson & Hammond, 2018). For example, in Phase II, rather than asking older adults to take photographs, the researcher took the photographs based on the conducted discussions and the older adults' instructions. Furthermore, contradicting the traditional hierarchy and top-down development of health care organizations (Essex et al., 2023), the study was conducted placing the nursing staff members in the active role of developing their own practices, aiming for *democratic participation*, sharing power more equally, using the research process as a platform for *active learning*, and taking *collective action* by identifying common goals. The aim of the study was *to make a difference* in the lives of the people participating in

the study by creating positive change for them, and the wider community of people living and working in ILTC. (ICPHR, 2022)

In line with the ethical principles of the Finnish National Board on Research Integrity (TENK, 2019), ethical approvals were sought prior to conducting research with the vulnerable population of older adults in ILTC (Diaz-Gil et al., 2023). The approvals were sought from the University Ethics Committee for phases II (5/2022/14.2.2022) and III (TY/40/12.12.2022). In addition, ethical approval was obtained for two amendments of data collection in phase III (TY/131/06.01.01/2024; TY/699/06.01.01/2023). Furthermore, in Phase III, as the study plan was made by the researchers before the start of the study, they were designed to include options for methodological adaptations in the process to enable shared decision making (Godfrey-Faussett, 2022), and symmetrical relationships between academic researchers and the staff, older adults, and their family members (Tiefenthaler et al., 2022). Research permits were obtained before the start of the sub-studies, from the participating organizations in phases II (H22/16.3.2022) and III (2023-001224 T 13 02 01). No ethical review or research permit was needed in phase I, as a literature review was conducted. In Phase III, for the use of copyrighted instruments, permissions were obtained from the copyright holders by email.

The study was conducted according to the principles of voluntary participation and the right to withdraw at any moment without consequences (TENK, 2019). We recruited participants in Phases II and III by providing sub-group specific information letters to be distributed in the units. Additionally, in Phase III, posters were distributed to the unit. Moreover, the study was presented to the staff in a unit meeting and to family members during a family member evening organized by the unit. Staff members of the units acted as liaisons between the voluntary participants and the researchers, identifying participants meeting the eligibility criteria, and organizing individual meetings to inform the participants and obtaining informed consent. Participants were given information in writing and orally about the research purpose and process, assessed harms and benefits of the study, data handling, and participants' rights and restrictions to these. Also, data protection statements specific to each sub-group were provided in accordance with Articles 13 and 14 of the European Union's General Data Protection Regulation 2016/679. Subsequently, consent from participants was obtained in writing.

As older adults in ILTC experience advanced deterioration in functioning (Barker et al., 2020), family members are important advocates for the older adults, their interests, needs and wishes (Hovenga et al., 2024). Due to these reasons, we informed family members about the research in Phases II and III. In Phase II, we included only older adults that were capable of providing informed consent on their own. In Phase III, we also involved older adults who could not provide informed

consent on their own. In both phases, when the older adult was assessed capable of providing informed consent, family member confirmation for participation was not requested, as this could have undermined the autonomy of the older adult (Halonen et al., 2025). In Phase III, when the older adult was assessed to not be capable of providing informed consent on their own due to deteriorations in cognitive functioning, a family member was asked to provide consent after consultation with the older adult. The ability to provide informed consent was assessed in both phases by staff members knowing the older adults and making similar assessments in everyday care. To ensure choice and control of older adults within the research process, their consent was also assessed throughout the study process.

Handling of data in Phases II and III was planned prior to the conduct of the studies in study specific data management plans, reviewed as a part of obtaining ethical approval. The university's lawyers were consulted in the process of planning data management. Personal data of participants were handled according to the legislation of Finland (Data Protection Act 1050/2018) and the regulations of the European Union (General Data Protection Regulation 2016/679, articles 13, 14). Data collected during interviews, focus groups, group discussions, workshops, observations, and meetings were anonymized in the transcription processes. Photographs taken of persons, who had given permission to be photographed, were anonymized by picture modifications. Data collected with questionnaires, accelerometers, and from patient records were pseudonymized with key codes, that were separately kept and only accessible to the doctoral researcher.

The researchers committed to personal integrity by following the Finnish ethical principles of conducting research with human participants (TENK, 2023), and those of participatory research (ICPHR, 2022). Considering the open nature of participatory research, reflexivity of the doctoral researcher about her positionality within the research and considering the effects of choices on the study (Finlay, 2002) played an important role in ensuring integrity. Reflexivity was conducted by journaling, especially in Phase III (Coghlan & Brydon-Miller, 2014). Furthermore, we adhered to the International Committee of Medical Journal Editors (ICMJE) guidelines for the conduct, reporting, and publication of the research (ICMJE, 2025).

Generative artificial intelligence was used and reported according to the guidelines of the European Research Area Forum (European Commission, 2025), and policies of the University of Turku (University of Turku, 2023a, 2023b). Generative artificial intelligence was mostly used to search for information and identify references using ChatGPT (version 4o, 5) and Microsoft Copilot (version GPT-4 Turbo). In addition, it was used in a limited manner with the following tools for: 1) brainstorming (ChatGPT, version 4o, 5; Microsoft Copilot, version GPT-4 Turbo), 2) data extraction for the review of literature presented in the background

section (Microsoft Copilot, version GPT-4 Turbo), 3) identifying citation information for references (Scite), 4) translating text from Finnish to English (ChatGPT version 4o, 5; Microsoft Copilot, version GPT-4 Turbo), and 5) language checking (ChatGPT version 4o, 5; Copilot, version GPT-4 Turbo). No research data was entered into any of the tools. All outputs generated by artificial intelligence were confirmed and final products were written according to the standards of scientific writing, for example, by reading original references suggested by the tools, and double-checking and modifying extracted data.

5 Findings

5.1 Nursing practice using the environment to promote older adults' physical activity in institutional long-term care

In this chapter, a synthesis of promoting older adults' physical activity as nursing practice using the environment in ILTC will be presented. First, the three sub-questions of the study will be answered, focusing on the three domains of the nursing metaparadigm at the focus of the study: client (chapter 5.1.1), practice (chapter 5.1.2), and environment (chapters 5.1.3). Then, a metaphorical model will be presented, to provide a synthesis of the findings to answer the research question of the study (chapter 5.1.4). The detailed findings of Phases I-III can be found in Papers I- IV.

5.1.1 The physical activity of older adults

Older adults' physical activity levels were low based on the qualitative findings about passivity of older adults' lives (Papers II, III, IV) and the results of accelerometer measurements (Paper III, IV). Measured with accelerometers, the average physical activity of study participants was 1.1-1.3 hours per day (Paper III, IV). Additionally, consistent with qualitative descriptions about ways of being active (described below) and accelerometer measurements, activity was of light intensity. Measured with accelerometers, study participants' physical activity consisted of 34.2% of standing and 65.2% of light walking, and 0.6% of moderate-intensity walking and cycling. (Paper III)

Six forms of physical activity were identified in the qualitative findings that older adults could or would engage in, in the ILTC setting. These included basic activities of daily living, independent ambulation, outdoor activity, organized recreation, exercise, and participation in daily chores (Paper II, III, IV).

Basic activities of daily living and independent ambulation accounted for more than 90 percent of older adults' physical activity (Paper III). In basic activities of daily living older adults' physical activity was produced by conducting basic care activities and being mobile in transfers (Paper III, IV). Independent ambulation

meant that older adults walked and ambulated by wheelchairs independently or with other residents in their living units, all of which were closed units (Paper II, III). Some few residents without dementia were also allowed to move outdoors independently but needed the staff to open the locked unit doors (Paper II).

Outdoor activity was perceived important by older adults and staff members (Paper II, III, IV). Outdoor activity was mostly walking and ambulating outdoors, but could also include other recreational activities (Paper II, III). Outdoor activity occurred less than some residents hoped for (Paper II), and less than planned (Paper III). For example, in the participating unit of Phase III, the goal was that all older adults would go outdoors once a week. In practice, less than one third of the older adults went outdoors with staff members. (Paper III) In the winter, outdoor activity occurred even less (Paper II, III, IV), but was also less desired by the older adults than during other seasons (Paper II). To improve the outdoor activity of older adults who refused to go outdoors, increasing motivation by organizing different activities outdoors and rewarding them were perceived as possible strategies (Paper IV).

Recreation older adults could engage in was limited and did not result in much physical activity. Most organized activities were passive in nature, such as bingo, musical activities, hobby-crafts, and events. (Paper II, III) Staff perceived that physical activity could be increased, for example, by organizing different games indoors and outdoors. In addition, excursions to various public places, events, and nature could be used, and were recurrently look forward to by the older adults (Paper IV).

Older adults' exercise to maintain or improve physical functioning was perceived important. Identified forms of exercise included gym and chair exercising, walking exercises in even terrain and stairs, riding a restorator ergometer (Paper II, III), ball games, dancing, stretching, and yoga (Paper IV). However, older adults mostly did not engage in exercising in the ILTC units as exercise was not organized. Some older adults wished to have more opportunities for exercising (Paper II, IV), organized by staff, as independent exercising was not feasible for them due to severe limitations in functioning (Paper II). Dancing was especially desired as an activity (Paper IV). In Phase III, new physical group activities as exercise and recreational activities were started for the older adults by nurses. Older adults were observed to enjoy the new activities, and these were perceived by staff to have increased the physical activity of older adults. However, quantitative measurements showed only a non-statistically significant positive result, as the average weekly physical activity of older adults (n=12) at pre-measurement was 7,72 h and 9,05 h at post-measurement (p=0,399). (Paper IV)

Participation in daily chores was seen as an opportunity for older adults to be physically active. Possible chores included things everyone had done in earlier life before moving to the ILTC facilities, food preparation during mealtimes and doing

household work like laundry and ironing. (Paper II, IV) Older adults especially were interesting in participating in setting the table, folding napkins, and baking (Paper IV). However, the extent to which older adults engaged in daily chores was very limited (Paper II, IV). In Phase III, participation in daily chores was improved by engaging older adults in mealtime activities by buttering their own bread, pouring their own drinks, and taking their own hot meals from the kitchen (Paper IV).

Overall, older adults were perceived to lack physical activities (Paper II, IV), and some older adults felt they had nothing to do (Paper II, IV). Independently, they engaged in passive activities, mostly including watching tv and listening to the radio (Paper II, III). Staff perceived that new activities and ideas for them were needed, also to engage those older adults in activities who were not currently participating (Paper IV).

5.1.2 Nursing practice in the promotion of older adults' physical activity

Currently, promoting physical activity as nursing practice occurs mostly through promoting the independence of older adults in the basic activities of daily living, in relation to their independent ambulation, and organizing some outdoor activity. These were perceived a part of the nurses' role and conducted in their practice at least to some extent. (Paper II, III) Care and activities planning based on assessments of residents' functioning guided the conduct of these activities (Paper III).

In basic activities of daily living, older adults' physical activity was promoted by a function-focused care approach by nurses. Adjusting care to the health and functioning of residents, older adults' independence could be promoted in basic care activities and transfers. To provide care in such a way required being present, assessing residents' abilities, energy levels, and mood at a given time, and guiding and encouraging them. (Paper I, III) However, when nurses experienced being in a hurry, they expedited their work by doing things for the residents (Paper I, II, III, IV).

Practices related to residents' freedom of movement enabled and impeded independent ambulation depending on their use (Paper I, II, III). In general, doors were kept locked to keep residents safe inside their living units (Paper II, III) but opened to some residents that were allowed to go outdoors independently (Paper II). Independent ambulation in the unit was facilitated by keeping the doors of the two group homes on the same floor open during the daytime, to allow residents to walk around (Paper III). Freedom of movement was also enabled by avoiding the use of restraints and actively looking for strategies to allow safe movement. For example, a mattress was placed next to a down-positioned bed to allow safely getting off the bed for residents that were known to move during the night. (Paper III) However,

various restraints were used, which restricted the residents' physical activity. These included direct and indirect restraints, such as bed rails, wheelchair belts (Paper I, II, III), removing mobility aids (Paper I, II), keeping the residents undressed, and by lying, threatening, and diverting their attention (Paper I).

Nurses were responsible for going outdoors with residents, most of whom could not do so independently (Paper II, III). Outdoor activity was organized significantly less than planned, which related to the lack of resources (Paper II, III, IV) but also staff member decision to not conduct outdoor activity in the winter time (Paper II, III). It was conceived as important that staff were enabled to organize more outdoor activity and improve collaboration. (Paper IV)

Physical activity promotion through the three other forms of physical activity, recreation, exercise, and daily chores, was limited in nursing practice and provided opportunities for development of activity promotion. Nurses sometimes lacked motivation for activity organization (Paper I, IV) or it was not perceived to be a part of their role (Paper I). Nurses involvement in delivery of recreational activities and exercise was the intention but it occurred in practice only to a limited extent (Paper II, III). Daily chores were perceived as an opportunity to activate older adults but were not used in nursing practice (III). To improve physical activity promotion as organized recreation, exercise, and daily chores, nurses wished for new ideas for activities and how to organize them (Paper IV). In Phase III, nurses' role in activity delivery was changed by co-developing their practices, and the nurses started to deliver exercise and recreational activities for older adults in new activity groups, and activating older adults during meal times. This required collaboration by the staff, including nurses, rehabilitation professionals, and head nurses collaborating to ideate new solutions for activity promotion, and learning to do and organize nursing work in new ways. (Paper IV)

Despite identifying older adults' personal interests, preferences, motivation, and life history as important elements to engage in them in physical activities (Paper IV), these were not much employed in organizing physical activity (II, III) or developing physical activity promotion (IV).

Interprofessional collaboration benefitted nurses in promotion of older adults' physical activity. Furthermore, different professionals were in involved in the delivery of older adults' activities, however, to a varying extent.

Assessments and subsequent care and activities planning were conducted in collaboration of the nurses and the physiotherapist. Furthermore, the rehabilitation professionals trained nursing staff members to use kinestetics in care and helped them in practice to, for example, conduct transfers. The physiotherapist also collaborated with the nurses to plan the use of mobility aids, restraints, and solutions to minimize the use of restraints. (Paper III) Developing physical activity promotion,

the rehabilitation professionals acted as important leaders in the process of co-producing and implementing change (Paper IV).

The physiotherapists had a direct role in physical activity promotion and delivered a substantial amount of older adults' physical activities if there were resources allocated to physiotherapy (Paper II, III). In the units in Phase II, physiotherapists had earlier been in charge of organizing exercise for the older adults but were no longer working in the four nursing homes. According to the nurses, rehabilitation resources were scarce, and residents could only have occasional visits by physiotherapists. Nurses had been given the responsibility for organizing exercise, however, in practice, it was not done. (Paper II)

On the other hand, in the participating unit in Phase IV, rehabilitation resources were high, and rehabilitation was delivered by physio- and occupational therapists to those older adults that were assessed to have rehabilitation potential. The in-unit physiotherapist delivered most physical activity to the residents as exercise, targeted to those older adults that had physiotherapy plans. Despite substantively high resources allocated for physiotherapy, it was considered that their time for promoting the activity of the 25 residents living in the unit was insufficient; thus, highlighting the nurses' role in activity promotion as they spent the most time with the residents. Furthermore, the physiotherapist delivered exercise only to some of the older adults. (Paper III)

Occupational therapy could also result in physical activity for the older adults having occupational therapy plans through different activities aimed at promoting all aspects of their functioning (Paper III). Various other professionals were also involved in the delivery of activities for older adults, including social workers, cultural instructors, and recreational activity workers. However, the activities they delivered were mostly passive in nature. (Paper II, III)

5.1.3 The environment used for the promotion of older adults' physical activity

The environmental elements in the physical, social, and symbolic dimensions of the environment produced a context for older adults' physical activity, physical activity promotion as nursing practice, and provided opportunities to stimulate older adults' physical activity.

Physical environment

In the physical environment, the elements related to the accessibility and stimulation of the outdoor environment, indoor environment, and aids, equipment, and technology (Table 17). In the Finnish care context, new or recently renovated

facilities were perceived to be accessible (Paper II, III, IV), whereas older unrenovated facilities produced various barriers for physical activity due to their lack of accessibility features (Paper II).

The accessibility features of the physical environment benefitted both the older adults in safe physical activity and the nurses in promoting the older adults' physical activity. The accessibility of the facilities enabled older adults to move safely (Paper I, II, III), promoting their independence in the basic activities of daily living and independent ambulation (Paper III). An accessible environment enabled them to move and turn in their rooms, toilets, hallways, common areas, and outdoors using mobility aids. Accessible facilities also had a good layout, were spacious and bright, and had appropriate walking surfaces, doors, doorways, and elevators. (Paper I, II, III) Furthermore, the accessibility of the physical environment produced a physical context for the nurse to provide care safely (Paper I, II).

The stimulating features of the environment activated the older adults to move. Proximity to public facilities (Paper I) and nature (Paper I, II) stimulated the older adults' physical activity. Outdoor spaces were important to activate older adults (Paper I, II), and enclosed yards were found important for older adults' experiencing deterioration in cognitive functioning (Paper II). Indoors, suitable layouts and walking paths activated older adults to move (Paper I, II, III). Spaces dedicated to organizing physical activities (Paper I, II) and services within the facilities (Paper III) were important for stimulating physical activity.

Activating elements in hallways and walls, such as tasks, things to touch and look at (Paper I, IV), elements of nature (Paper IV), different wall colors, furniture, carpets (Paper I), and old goods (Paper IV), were perceived as opportunities to stimulate older adults to move (Paper I, IV), whereas "bare walls and hallways" were considered unstimulating (Paper IV). In addition, various equipment and technology could be used to stimulate older adults' physical activity, for example, exercise equipment like dumbbells (Paper I, IV) and virtual cycling as biking with a restorator ergometer while watching a video with a changing landscape (Paper I, II). In phase III, different tasks for physical exercises, pictorial, mathematical, verbal, and functional activities, and decorated hallway places, were integrated in the physical environment, co-developed by staff members. Independently ambulating residents could use the tasks independently, however, most older adults needed the help of other people to engage in activity using them. Staff and family could organize activities with them for older adults. Having a variety of tasks, these were perceived to provide stimulation for the physical activity of older adults with varying physical and cognitive functioning. (Paper IV)

Table 17. Elements in the dimension of physical environment promoting older adults' physical activity (Papers I-IV). In the column 'Quality of elements' unbolded text depicts the function of accessibility and bolding the function of stimulation.

Element		Quality of elements
Outdoor environment	Natural environment	No hills **Proximity to nature**
	Location	**Proximity to public facilities and gardens, integration in a regular residential street**, not close to busy roads
	Built outdoor environment	**Available gardens, courtyards, patios, terraces, greenhouses, and balconies, enclosed outdoor areas**, good maintenance of outdoor areas throughout the year, **walking paths**, good paving, shelter, shade, resting places
Indoor environment	Light, lightning	Well-lit, brightness, automatic lights
	Indoor layout	**Repetitive, or open floor plans, circular designs, and u-shape corridors**, no dead-end hallways and short corridors, **walking paths indoors** For nurses to monitor safe movement: staff areas close to rooms where residents spend time, nurses' visual access to hallways, open plans, glazed patios
	Spaciousness	Enough space to move, turn, and pass other residents with mobility aids in common areas, hallways, resident rooms, and toilets
	Walking surfaces	No stairs, doorsteps, steep pathways, ramps, shiny and multicolored floors
	Doors	Wide doorways, automatic doors, no locked, heavy, or difficult doors
	Elevators	Automatic, well-functioning
	Facilities	**Appropriate space dedicated to organizing activities, gyms and exercising rooms,** enough storage space for activity equipment **Services within facilities, e.g., restaurant, hair salon, foot care, library**
	Visual stimulation	**Activating elements in hallways and walls, tasks, things to touch and look at, different wall colors, furniture, carpets**
	Furniture	**Resting places in hallways and common areas**
Aids, equipment, technology	Aids	Appropriate mobility aids, patient lifts, handrails, red signal color in bathrooms and toilets signage to navigate
	Clothing	Well-fitting shoes and clothing for indoor and outdoor use
	Equipment	**Sufficient and appropriate equipment and materials to organize activities and available for use with family members**
	Technology	Monitoring systems for resident safety **Activating technology**

Social environment

The social environment included the elements of the community of residents living in an ILTC unit, family members of the older adults, and the community beyond the facilities. The community of older adults living in an ILTC unit both promoted and impeded their activity. For the most part living together with other residents provided opportunities for shared daily life that could promote activity. Meals were shared together in common areas, meaning that residents would move to the shared facilities several times per day from their rooms, increasing their activity. (Paper II) Having the company of other residents motivated to engage in physical activities and movement within the facilities (Paper II) and brought joy to the residents (Paper IV). Residents helped each other to be mobile. On the other hand, some residents felt lonely within the community of the residents due to differences in functioning or interests. Some older adults limited their movement within the common facilities to avoid interacting with other residents. (Paper II)

Family members were important for older adults' physical activity in three ways: influencing activity, giving information to staff, and facilitating activity. Family members influenced older adults' physical activity by informing them about activity opportunities. Their encouragement enabled physical activity, but negative and risk-avoiding opinions could also impede older adults' physical activity. (Paper I) To understand physical activity preferences of older adults experiencing advanced cognitive decline, family members were perceived as an important source of information (Paper IV). Family members facilitated activity by helping the older adults to walk and move indoors and outdoors (Paper I, II, III, IV). Nevertheless, family member visits were perceived to include mostly passive activities (Paper III). Having activity equipment (Paper II) and stimulating features in the physical environment (Paper IV) facilitated family members conducting physical activities together with older adults during their visits. Education for family members about residents' functioning (Paper I) and involving them more in organizing physical activities for older adults (Paper IV) were perceived as opportunities to increase older adults' physical activity.

Having contact with the wider community beyond the facilities was perceived important for older adults' physical activity, whereas isolation impeded activity (Paper I). Contact with the wider community could mean visiting public areas and facilities, interactions with community members in outdoor spaces of the facilities and having visits from community members in the facilities (Paper I, IV). To organize physical activities for older adults, various groups of people were perceived as possible partners (Paper I, II, IV), but not currently much involved in physical activity promotion (Paper IV). These included people living close by, families with babies or dogs, schools, daycare groups, nursing students (Paper IV), and volunteers

(Paper I, IV). Activities with these groups could include, for example, walks together, games, and exercise in the unit, outdoors, or during excursions (Paper IV).

Symbolic environment

In the symbolic environment, care culture and time produced a context in which to engage in physical activity and to promote older adults' physical activity. Care culture is manifested through institutional norms, values, routines, and rules.

The norm seemed to be that older adults' daily lives consisted of basic care situations, independent passive activities like watching tv, and having occasional organized, mostly passive events and activities. Those who could independently ambulate could do so varyingly, as sometimes their freedom of movement was restricted using direct and indirect restraints. Those needing support in moving, had to spend their time mostly passively. Other care needs were prioritized over physical activity promotion (Paper I, II, III, IV), and residents' own preferences or wishes for physical activities were only considered to a limited extent (Paper II, III, IV).

Organizations' and professionals' values guided physical activity promotion (Paper I). This was evidenced in practices, such as instructing the older adult to avoid moving after a certain decline in functioning (Paper I) and goal-orientated working to improve the older adults' functioning despite existing deterioration (Paper III). Safety seemed to be valued over residents' freedom of movement. All residents' freedom of movement was restricted by organizing care in closed units with no access beyond the units, with the justification of safety. Moreover, those older adults that could independently safely move beyond the unit, were locked indoors and needed the help of personnel to have access outdoors. (Paper II, III) The extent to which direct and indirect restraints were used related to the care culture of the facilities (Paper I, III).

Institutional routines and rules affected staff members as well as residents, impeding activity promotion. Staff members performed routines (Paper I, II) and prioritized task completion over physical activity promotion (Paper I, III). When no time was allocated to providing physical activities, conducting such activities in the midst of other work rarely occurred (Paper II, III), despite nurses being responsible for planned physical activities (Paper III). On the other hand, having a fixed time for physical activities facilitated their delivery (Paper IV). Restrictive policies impeded the staff's opportunities to organize activities for residents and this included older adults' independent physical activities (Paper I). On the other hand, a low hierarchy and a bottom-up organizational culture promoting flexibility (Paper IV) and experimentation (Paper II, IV) were found beneficial for physical activity promotion. Providing staff opportunities for teamwork and co-development facilitated producing and implementing new solutions for physical activity promotion without

additional staff or time resources. This included developing practices and the environment, but also learning to use available time differently, while accepting that producing care culture change could happen but only gradually. (Paper IV)

5.1.4 The metaphorical model

For the purpose of depicting the overall synthesis of promoting older adults' physical activity as nursing practice using the environment, a metaphorical model was developed. It depicts the relationships of different concepts in the domains of the client, practice, and environment, for the promotion of older adults' physical activity in ILTC. The used metaphor is that of a *Growing Flower* (Figure 7).

The metaphor of a growing flower depicts a flower growing in the ground under the sun, supported by a plant support stick. The different parts of the Flower (the bloom, the green parts and the roots) and its surroundings (ground, plant support stick, and sun) represent the elements in the dimensions of the client, practice, and environment (Kim, 2010, p. 79), and their relationship to one another for older adults' physical activity promotion as nursing practice using the environment in ILTC.

The bloom, consisting of six petals and a flower disk, represents the older adults, that is, the elements in the domain of the client. The six petals represent older adults' physical activity, that is, the six forms of physical activity of older adults in ILTC. These include the basic activities of daily living, independent ambulation, outdoor activity, organized recreation, exercise, and daily chores (Paper II, III, IV). These forms of physical activity provide different opportunities for the older adult to be physically active and the nurse to promote the older adults' physical activity throughout daily life.

The petals of the flower grow from the flower center. The flower center represents the older adults' individuality and individual characteristics relating to their physical activity. Addressing the older adults' health and illnesses, pharmacological treatments, physical and cognitive functioning, and energy levels and mood at a given time, is vital to promoting their physical activity (Paper IV). In addition, the individual characteristics of older adults include their motivation, interests, and preferences for physical activity (Paper IV). These aspects affect how and how much older adults are capable and willing to engage in physical activity, and these need to be considered and addressed by the nurse to promote the older adults' physical activity. Thus, the flower center connects the petals of the flower (older adults' physical activity) and the stem of the flower (nursing practice).

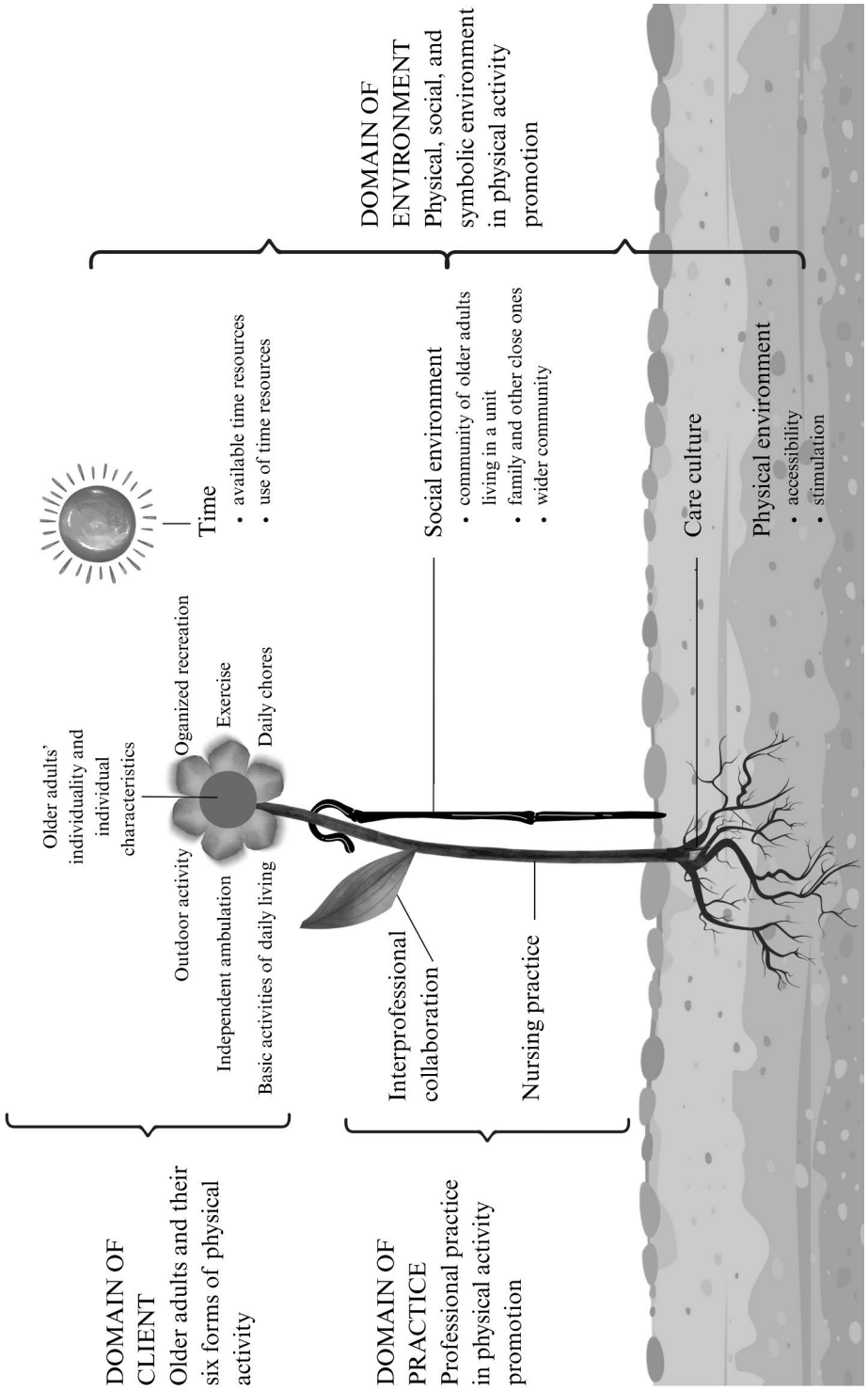

Figure 7. Metaphorical model of a Growing Flower.

The green parts of the growing flower, the *stem* and the *leaf* represent elements in the domain of practice. The stem represents nursing practice. The extent to which older adults can engage in the six forms of physical activity depends on nursing practices to promote older adults' physical activity in the ILTC setting. Without nursing the blossoming of the bloom is very limited due to the advanced deteriorations in health and functioning of older adults in ILTC, and the important role of nursing to support the older adults to meet their basic needs. Thus, the bloom grows from the stem.

The leaf also grows from the stem. The leaf represents interprofessional collaboration. Promotion of older adults' physical activity can take place as the collaboration of several professionals in ILTC having varying responsibilities and roles in the promotion of older adults' physical activity. Older adults' physical activity promotion can be conducted solely by nurses but benefits from collaboration with different professionals having different knowledge and skills, working towards shared goals. As the leaf helps the flower to grow, so does interprofessional collaboration benefit nursing practice to promote older adults' physical activity. Thus, the leaf grows from the stem.

The basis of the growing flower are its *roots*. The roots depict care culture. How and how much older adults' life is perceived to include physical activities and how and to what extent older adults' physical activity is promoted as nursing practice, is rooted in the care culture, and depends on it. If the roots are unwell, the flower cannot properly grow, and does not bloom. Thus, the basis of the flower are its roots.

The flower as a whole grows from the ground. The *ground* represents the physical environment, and its characteristics of accessibility and stimulation. How the older adults' abilities match the characteristics of the physical environment affects the physical activities they can engage in with the support of the nurse. The physical environment is the concrete context in which the corporeal functions of the movement of older adults and the nursing work take place. Furthermore, the physical environment of nursing is something that can also be utilized. As the flower draws nutrients and water from the ground to grow, so the nurse can use the elements of the physical environment to activate older adults. Thus, the flower grows from the ground.

The flower is supported by a plant support stick. The *plant support stick* represents the social environment. The social environment includes the community of older adults' living in the unit, their family and other close ones, and the wider community. The social environment may be employed to support older adults' physical activity promotion as nursing practice. However, without it, older adults can and should also be supported to engage in physical activity. Thus, the plant support stick supports the growth of the flower.

Above the flower, there is the sun. The *sun* depicts time. As necessary for the growth of the flower, time is essential in promoting older adults' physical activity as nursing practice using the environment. The time the nurses have available, sets the boundaries in which physical activity can be promoted and to what extent. As without sufficient sunlight the flower does not grow or bloom, without sufficient time, older adults' physical activity cannot be promoted. However, as the flower can turn towards the sun to grow, so can the nurses optimize the use of existing time resources to promote the physical activity of older adults. Thus, the flower grows under the sun.

5.2 Summary of the main findings

Using a cyclical four-phased process, the study produced a comprehensive understanding of the promotion of older adults' physical activity as nursing practice using the environment developing a metaphorical model rooted in the metaparadigm of nursing.

Older adults' physical activity levels were low in ILTC. Physical activity was identified to consist of six forms. These included basic activities of daily living, independent ambulation, outdoor activity, organized recreation, exercise, and daily chores. How the older adult could and wanted to engage in these forms of physical activity was related to one's individual characteristics of health, functioning, and individual preferences.

The role of the nurse was crucial for the older adult to engage in physical activity in ILTC, due to advanced deterioration in the older adults' health and functioning. The promotion of older adults' physical activity as nursing practice occurs mostly in the basic activities of daily living, in relation to independent ambulation, and organizing some outdoor activity. There was a lack of physical activity promotion as organized recreation, exercise, and daily chores, which provided opportunities for developing activity promotion practices. Interprofessional collaboration benefitted physical activity promotion, but resources to involve other professionals in physical activity promotion varied largely between units.

Physical and social environments could be employed by nurses in the promotion of older adults' physical activity. The qualities of the physical environment for the physical activity of older adults, included accessibility and stimulation. These provided a physical context for the nurse to promote older adults' physical activity as well as a context for the older adult to engage in physical activity. Furthermore, the nurse acted as a mediator between the older adult and their physical environment, as the nurse could modify and employ the elements of the physical environment to enable and stimulate the older adult to engage in physical activity.

The social environment for older adults' physical activity included the community of residents living in an ILTC unit, family members of the older adults, and the community beyond the facilities. The social environment was not necessary for the older adult to engage in physical activity and the nurse to promote physical activity, but the social environment could be employed in activity promotion. However, using the social environment in older adults' physical activity promotion was rather limited at present, and could provide various opportunities for improvements.

Care culture and time formed a context for physical activity promotion as nursing practice. Institutional norms, values, routines, and rules were cultural factors impeding older adults' physical activity and its promotion. On the other hand, care culture with a low hierarchy and bottom-up opportunities for staff to develop their own practices and daily schedules facilitated physical activity promotion without additional resources.

The metaphorical model of a Growing Flower was developed. It depicts the relationships of different concepts in the domains of the client, practice, and environment, relating to the promotion of older adults' physical activity as nursing practice using the environment in ILTC. The model depicts the different forms of older adults' physical activity and emphasizes the importance of nursing and interprofessional collaboration for older adults to engage in these forms of physical activity experiencing advanced functional decline in ILTC. The model depicts the qualities of the physical environment, care culture and time as the context in which older adult' physical activity promotion takes place, being vital for older adults' physical activity and enabling nursing work to promote older adults' physical activity. Also, the model depicts the role of the social environment as a supportive component in the promotion of older adults' physical activity in ILTC (Table 18).

Table 18. Summary of the main findings and the metaphorical model.

Main findings – Summary		
Client	**Practice**	**Environment**
• Older adults' physical activity in ILTC consists of six forms, including independent ambulation, basic activities of daily living, outdoor activity, recreation, exercise, and daily chores. • Older adults' capability and willingness for physical activity is related to their health, functioning, and individual preferences, which need to be considered by the nurse to promote their physical activity.	• Current nursing practice to promote older adults' physical activity relates to older adults' basic activities of daily living, independent ambulation, and organizing outdoor activity. • Physical activity promotion in different physical activities can be developed by learning and collaborating to develop physical activity promotion. • Nursing practice to promote physical activity benefits from interprofessional collaboration.	• Considering the physical environment, two qualities, accessibility and stimulation, relate to older adults' physical activity. • The social environment relating to older adults' physical activity includes other residents in the unit, family members, and the wider community beyond the facilities. • Care culture and time form a context in which to engage in physical activity and to promote physical activity.
The metaphorical model – Summary		
• Provides a comprehensive understanding on older adults' physical activity promotion as nursing practice using the environment. • Depicts the different forms of older adults' physical activity that can be promoted in ILTC and the importance of considering individuality to promote one's physical activity. • Highlights the importance of nursing practice and the benefits of interprofessional collaboration for the promotion of older adults' physical activity in ILTC. • Depicts the qualities of the physical environment, care culture, and time as the context in which older adults' physical activity promotion as nursing practice takes place in ILTC. • Depicts the physical and social environments to include employable elements in the promotion of older adults' physical activity in ILTC as nursing practice.		

6 Discussion

6.1 Discussion of the findings

This study produced a comprehensive understanding on the promotion of the physical activity of older adults in ILTC as nursing practice using the environment. The study's novelty lies in the collaborative exploration of the topic, rooted in the metaparadigm of nursing, integrating multiple domains to achieve a holistic perspective on older adults' physical activity promotion, and enabling care culture change. The findings are discussed below according to the domains of the nursing metaparadigm and for the metaphorical model.

Domain of client

The study produced insights into older adults' physical activity in ILTC, offering a foundation for improving its promotion. Currently, there seems to be a lack of perception that older adults' physical activity can be an integral part of everyday life, taking into consideration the extent to which it is promoted. The study produced findings of low physical activity levels and light intensity activity of older adults in the Finnish ILTC context that are similar to those of other countries (den Ouden et al., 2015; Hahn et al., 2023; Liu et al., 2020; Mc Ardle et al., 2021; Parry et al., 2019). These levels stay far behind the recommended levels of older adults' physical activity (de Souto Barreto et al., 2016; Peyrusqué et al., 2023).

Six forms of physical activity for older adults in ILTC were identified in the present study, including basic activities of daily living, independent ambulation, outdoor activity, organized recreation, exercise, and daily chores. However, older adults mostly engaged in the basic activities of daily living and independent ambulation, which is consistent with previous research in other countries (den Ouden et al., 2015; Hahn et al., 2023; Mc Ardle et al., 2021), and points to the insufficient promotion of physical activities for older adults that could benefit from them. There was a lack of meeting the older adults' personal wishes and needs for physical activities, which reflects the national ILTC satisfaction surveys. In the survey, the lowest satisfaction by older adults for their services was expressed towards their opportunities for organized activities (Leppäaho et al., 2024). These findings

highlight the need to rethink how physical activity is understood and promoted in ILTC. Even small increases in older adults' physical activity could produce benefits for their health and wellbeing (Mc Ardle et al., 2021). The insights from the domains of practice and environment, together with the developed metaphorical model offer valuable tools to improve the promotion of older adults' physical activity in ILTC.

Domain of practice

Current professional work and resources seem to be insufficient to adequately promote older adults' physical activity and meeting their needs for physical activities. The findings reflect traditional professional roles, nurses' being in charge of older adults' basic activities of daily living (Pesonen et al., 2022), and physiotherapists delivering physical activities (Wylie et al., 2023). Considering the low resources for rehabilitation professionals' work in ILTC (Kehusmaa & Alastalo, 2021), and the varying needs older adults have for physical activity, this leads to neglected care needs.

Promoting older adults' independence in the basic activities of daily living through function-focused care was perceived to be an integral part of nursing practice. Considering the long history of nursing to *do for* the client (Wade, 2015), this is a positive finding. It should be noted, however, that the extent to which nurses actually conducted work in this way, was not explored in the present study. Delivering function focused care requires various competences (Lotvonen et al., 2025), and research on the topic in Finland is scarce (Lotvonen et al., 2024), highlighting the need for further research. Considering that basic activities of daily living consist a considerable portion of the time nurses spend with the older adults (Pesonen et al., 2022), promoting independence in these activities could be considered the foundation of physical activity promotion as nursing practice. Its importance is highlighted by the evidence of its effectiveness in improving, for example, older adults' physical functioning (Henskens et al., 2018), and function in activities of daily living (Morris et al., 1999).

Based on the findings, physical activities delivered by professionals mostly include some kind of exercise, and these activities are mostly delivered by physiotherapists. Outdoor activity seems to be a shared responsibility of different professionals but consistent with previous findings from Finland (Karppanen et al., 2025; Leppäaho et al., 2024), is not sufficiently organized. These findings point to the evident need of improving physical activity promotion. A positive finding was that nurses' role and practices to promote older adults' physical activities could be developed by collaborative work. Not perceiving physical activity promotion as a part of nurses' role (Forster et al., 2021) and a lack of motivation by nurses (Fringer et al., 2014) are noteworthy barriers for older adults' physical activity, also raised in

the present study. On the other hand, education and training for nurses (Blindheim et al., 2023; Hahn et al., 2024), learning in a group (Fringer et al., 2014), and collaborative development of practices (Forster et al., 2021), facilitate improving physical activity promotion. As evidenced in this study, all of these factors can be addressed by providing nurses with the opportunity to learn about physical activity combined with opportunities and structure for them to develop their practices together with other professionals (Paper IV).

The traditional role of physiotherapists in charge of older adults' physical activities leads to perceiving physical activity as somewhat separate from other daily life activities (Bowes et al., 2022; Siira et al., 2021). The findings point to the opportunities there could be to use available rehabilitation resources to improve physical activity promotion through interprofessional collaboration. Interprofessional collaboration means that different professionals work as a team, sharing goals, sharing information, and conducting shared patient assessments (Doornebosch et al., 2022). The role of physiotherapists as a consistent part of the care team was found beneficial in the present study, similar to that in other academic work (Trollebø et al., 2024), for the promotion of older adults' physical activity as nursing practice. This is related, for example, to the use of restraints. Restraints produce various detriments for the older adults, such as decreasing well-being and mobility (Möhler et al., 2012), but their use is common, also in Finland (Edgren et al., 2024a). Restraints are justified by preventing falls (Portegijs et al., 2022a) but also used due to lack of staff resources (Lane & Harrington, 2011). By physiotherapists contributing to planning these measures together with nurses, they could be used only in rare situations (Paper III).

Moreover, the physiotherapists' role in improving physical activity promotion as nursing practice was vital (Paper IV). Indeed, in studies intervening on older adults' physical activity by nurses, the involvement of rehabilitation professionals in assessments and planning of older adults' and the units' needs are common strategies to implement new activities (Forster et al., 2021; Hurley et al., 2020). Also, nurses need training to improve their competences (Blindheim et al., 2023; Hahn et al., 2024), and education about the benefits of physical activity to increase their motivation to organize it (Karppanen et al., 2025), which physiotherapists could contribute to (Trollebø et al., 2024). This would require assessing the use of available physiotherapy resources in a new way, contributing with them to the overall development of physical activity promotion, instead of merely delivering rehabilitation to some older adults in ILTC.

Domain of the environment

Regarding the physical environment, two qualities, accessibility and stimulation, and various elements for each were identified relating to older adults' physical activity. This reflects the theoretical understanding of the increasing importance of the environment for support and stimulation as the older adults' functioning decreases (Lawton, 1989; Lawton & Nahemow, 1973). Based on the findings in the Finnish care context, the environment seems to be only partially employed to compensate for deteriorations in the older adults' physical, cognitive, and sensory functioning.

Accessibility means those qualities of the environment that enable it to be used by everyone, also by people with disabilities (Cambridge dictionary, 2025), and based on the findings, it seems to be better considered than stimulation in the Finnish ILTC environment. Indeed, in the past decades, knowledge and awareness has increased of the importance of accessibility (Broderick, 2020) and accessibility requirements have been implemented by law (Valtioneuvoston Asetus Rakennuksen Esteettömyydestä 241/2017).

On the other hand, there seems to be a lack of employing the physical environment to stimulate older adults' physical activity. Various identified stimulating features of the environment, such as outdoor spaces, are currently not within the reach of the older adults due to limited freedom of movement, that is, the older adults' right to independently decide where to go (van Liempd et al., 2022). Internationally, innovative care environments have been built that employ architectural choices to enable physical activity indoors and outdoors (Roberts, 2023; Rosteius et al., 2022), which could also be explored in the Finnish care context. This would also be important when considering the important health benefits of contact with nature and the community beyond the unit (Frumkin et al., 2017; Siegelaar et al., 2025).

In addition, using technology (Chu et al., 2022), interactive elements, and stimulating decor (Griffiths et al., 2024; Portegijs et al., 2022a) are solutions that can be used to activate older adults, also in traditional closed ILTC environments. Similar to the findings by Hahn and colleagues (2024), small modification to the physical environment were successfully implemented in the present study by collaboration with staff to developed them. These are encouraging examples about the opportunities there are in the physical environment to stimulate older adults' physical activity without substantive resource inputs. Furthermore, these kinds of solutions can provide staff members ready- and easy-to-use opportunities to engage older adults in physical activity in the midst of other daily work. Considering the limited time resources nursing staff have (Trollebø et al., 2024), providing such opportunities is vital to improve physical activity promotion.

Regarding the social environment, other residents living in the unit, family members of the older adults, and the community beyond the facilities were identified as relating to older adults' physical activity. These involvement of family members was currently employed to a limited extent in the Finnish care context, but could offer new opportunities to improve physical activity promotion.

In the research, the social environment has been successfully involved in delivering older adults' physical activities such as exercise (Chen et al., 2015; Morris et al., 1999) and walking (Rezola-Pardo et al., 2020) together with nursing staff members. Increasing their involvement has also the potential of sustaining activity delivery, when faced with staff shortages (Hahn et al., 2024). Currently, volunteer resources in Finland are limited, and only a minority of ILTC facilities employ volunteers weekly (7%) or monthly (16%) (Karppanen et al., 2025). Based on the findings, staff perceive there are considerable opportunities for increased involvement and engagement. However, initiating and maintaining the involvement of external persons requires substantive efforts (Handley et al., 2022). Noteworthy, in Nordic countries faced with the issues of nurse retention and shortage of care staff (Van Aerschot et al., 2022), the involvement of external resources, like volunteers and family members in physical activity promotion is currently considered even a necessity to achieve improvements (Karppanen et al., 2025; Trollebø et al., 2024). This most likely requires the involvement of the third sector and would benefit from allocated resources by policymakers.

With regard to the symbolic environment, care culture and time produced a context in which older adults could engage in physical activity and physical activity was promoted by nursing staff. Care culture here is defined as values, beliefs, and norms that people share and that guide their actions (Elder-Vass, 2012) in relation to care (Rytterström et al., 2009). Care culture is rooted in the conceptions and values that care workers, care organizations (Siira et al., 2021) and the wider society have about older people and ageing (Bowes et al., 2022). Care culture in the present study affected the extent physical activity was perceived to be a part of older adults' life and how their physical activity was promoted; how freely they could move, and what and how much physical activities they were offered. It seemed to enforce passivity rather than physical activity in ILTC. This echoes the traditional role of older adults in this setting as passive recipients of care (Holmerová et al., 2010) with limited agency (Pirhonen & Pietilä, 2018), and decaying bodies, implying incapability to engage in physical activity (Gubrium & Holstein, 1999), seen as a justification for further functional decline (Edgren et al., 2024b).

Furthermore, physical activity seems to be considered an add-on to normal life instead of being an integral part of it. This contributes to producing unmet needs as other tasks are prioritized (Trollebø et al., 2024) and physical activity is conducted only when having additional time for it (Ludlow et al., 2021). The status quo calls

for a paradigm shift to redefine older adults' physical activity as an integral part of everyday life and integrated into professionals' schedules and work plans. To achieve such a comprehensive change, the values and norms of professionals and organizations, need to be addressed (Forster et al., 2021; Hahn et al., 2024). As these are constantly shaped and reshaped through daily social interactions, the involvement of staff in achieving such a change is vital (Bowes et al., 2022). This study evidenced that collaborative work to produce change in this respect is possible.

Regarding time, a noteworthy result in the present study was improving the promotion of older adults' physical activity as nursing practice without additional staff resources. This was despite a lack of time, as a common barrier for physical activity promotion (Hirt et al., 2024), also being raised in the present study. Learning to use time and structuring the day's schedules in new ways were the key to improving this problem (Paper IV). Considering the limitations of staff resources in ILTC (Trollebø et al., 2024), this is a significant finding for the improvement of older adults' care. It should be noted, however, that using available resources differently in nursing practice to improve physical activity promotion, can help only to some extent. In Finland, at the same time, as the number of older adults in the need of LTC is increasing (Tilastokeskus, 2019), the number of older adults in institutional long-term care has been decreasing (Mielikäinen & Kuronen, 2024), as community living is favored by policymakers. In the future it can be expected that older adults in this setting experience even poorer health and functioning. This will evidently mean that older adults would increasingly also need the support of nurses to meet their care needs, such as engaging in physical activity. It is also noteworthy that the nurse-patient ratio in ILTC has also been decreasing due to lowered legal requirements (Saske, 2025). Based on the result of the present study this raises concerns about what the possibilities will be to meet the needs of physical activity for older adults in the future in ILTC.

Metaphorical model

The metaphorical model depicts the relationships of the different concepts in the domains of client, practice, and environment, providing a comprehensive understanding of the promotion of older adults' physical activity in ILTC as nursing practice using the environment.

The model depicts the different forms of older adults' physical activity that can be promoted in ILTC and the importance of considering individuality to promote physical activity. The used categorization of physical activities differs from that generally used for the adult population (Quinn & Barone Gibbs, 2023). Physical activities can be divided in various ways, and the subdivisions need to be mutually exclusive and sum up to the total physical activity of an individual (Caspersen et al.,

1985); the categorization in this study emphasizes the needs of this specific population living in ILTC. Moreover, it emphasizes the role of physical activity as a means to conduct daily life activities and participating in social interactions (Moulton et al., 2019), highlighting the need to promote different forms of physical activity. To do so, the older adults' attitudes, motivations, and expectations towards physical activity (Maurer et al., 2019), as well as their individual preferences for activities (Poveda-López et al., 2022) are vital to consider, in addition to their health and functioning.

The model highlights the importance of nursing practice for the physical activity of older adults in ILTC. As in Finland, criteria for receiving ILTC is strict (Act on Supporting the Functional Capacity of the Older Population and on Social and Health Services for Older Persons 980/2012) and the care dependency of older adults in these settings is high (Edgren et al., 2024b), nursing is vital for older adults to meet their care needs of physical activity. However, the model also depicts the different opportunities there are to promote older adults' physical activity as nursing practice, involving other professionals and people, and employing the environment. As resources are scarce for providing ILTC for older adults (Van Aerschot et al., 2022), the model highlights the opportunities to make small changes in different aspects producing benefits for the older adults. Furthermore, the model depicts the importance of the environment as the context for nurses to promote older adults' physical activity.

The model highlights the complexity of interrelated factors influencing older adults' physical activity in ILTC, and the need to address them. However, the model does not attempt to capture all the elements in the domains of the nursing metaparadigm, identified in the study, or to state cause-effect relationships between them. Rather the purpose of the model is to capture the essence of the produced findings (Hunter et al., 2002), and to draw a comprehensive synthesis from them (Braun, 2022). The use of the metaphorical model is in line with the research approach used, highlighting the importance of exchange between research and practice (ICPHR, 2013), making the results usable also for those whose life and work is at the focus of the research.

6.2 Trustworthiness of the study

The rigor of the research is assessed with the trustworthiness criteria introduced by Lincoln & Guba (1985), including credibility, transferability, dependability, and confirmability. These criteria were selected due to the qualitative emphasis of the mixed-method study.

Credibility refers to the extent that the produced findings accurately represent the research phenomenon and the reality of the participants (Lincoln & Guba, 1985,

p. 296). It should be noted that the research question evolved during the research process, as the study progressed and more was learned about the topic, which is natural in exploratory research (Agee, 2009). However, this affected the extent to which the findings were produced for each of the domains. As the original interest in the study was on the environment for older adults' physical activity promotion, most findings were produced for this domain. However, by also examining the domain of practice, a more truthful and comprehensive understanding of the research phenomenon was produced.

Credibility in the study was strengthened by triangulation (Lincoln & Guba, 1985, p. 305). Triangulation was used in relation to the methods but also the perspectives and settings used to explore each of the domains, and was used in all sub-studies and the summary synthesis. The use of different qualitative data collection methods and procedures (Phase II, III; Paper II, III, IV) ensured the inclusion of the perspectives of different participants with varying functioning (Dedding et al., 2022), involving those persons whom the study topic concerned, which is also foundational considering the participatory nature of the study (ICPHR, 2013). Furthermore, triangulation with qualitative and quantitative methods increased the credibility of the research, as older adults' physical activity and nursing practices could be examined with physical activity measurements (Phase III; Paper III, IV) and patient record transcripts of delivered physical activity (Phase III; Paper III, IV). The different settings included in the research (Phase II, Paper II; Phase III, Paper III, IV), including two urban areas in Finland and five ILTC units, increased triangulation with regard to the ILTC settings. Triangulation of the empirical findings for the domain of environment in the Finnish ILTC setting (Paper II, III, IV) with those of the conducted mixed-method literature review in the international context (Paper I) increased the credibility but also transferability of the findings for the domain of the environment.

In addition, the strategy of prolonged engagement, working in the field and building rapport with the participants was used as a strategy in the present study to improve credibility (Lincoln & Guba, 1985, p. 302-304). Time spent in field work had to be minimized in Phase II to avoid possible detriment to participants in the midst of the Covid-19 pandemic. The credibility of those findings was, however, increased by staff participants' own interpretation of the photographs they and their colleagues had taken (Paper II). Additionally, the doctoral researcher conducting field work was familiar with the ILTC setting, having experience working in this setting as a nurse earlier, making it more approachable to collect data in a more limited time frame. Later, in Phase III, prolonged engagement was used, and was foundational for the conduct of the participatory action research study (Paper III, IV).

Regarding the participatory nature of the study in Phase III (Paper III, IV), the following aspects should also be considered when assessing the credibility of findings. As sharing decision making and power between academic researchers' and persons living and working in the ILTC setting is a key facet in participatory research, the participants made decisions on data collection methods, interpreted findings, and implemented actions for change in collaboration with the academic researchers (ICPHR, 2024), increasing credibility of these findings. Ethical symmetry – defined as a balanced relationship between academic researchers and study participants (Tiefenthaler et al., 2022) – was achieved with the staff members during the research process. However, it should be noted that the study failed to some extent to challenge the former hierarchy of decision making (Bussu et al., 2021) by facilitating health professionals to question their power over and roles in relation to service users (ICPHR, 2024). As the role of the older adults and family members was more limited in co-producing change (Paper IV), the findings may be more representative of the reality of staff the members.

Transferability examines the usability of the findings in other contexts or settings (Lincoln & Guba, 1985, p. 297). The findings were produced in the context of Finnish ILTC, having specific characteristics with regard to the population living in (Edgren et al., 2024b) and the organization (Mielikäinen & Kuronen, 2024) of ILTC. In addition, the sample sizes in Phases II and III were small, and included participants in two urban areas in Finland, which could be considered to undermine the transferability of the findings. These factors, however, conferred with the used theoretical and methodological approaches, emphasizing the inclusion of persons whose life and work is at the focus of the research, in a local setting that can adopt the changes resulting from the research (ICPHR, 2024). To allow assessing the transferability of the findings in other contexts, used sampling strategies, included research participants, and the research contexts and processes were described in detail (Ahmed, 2024) in the research articles (Paper I-IV) and the summary book.

Dependability examines the consistency and stability of the research findings over time (Lincoln & Guba, 1985, p. 299), and can be increased by methodological documentation and keeping an audit trail (Ahmed, 2024). To ensure dependability of the findings, the research processes and data collection and analyses techniques were reported in detail in the research articles (Paper I-IV) and the summary book. The qualitative analyses in the study were conducted solely by the doctoral researcher. This corresponds with the interpretive and reflexive nature of the used thematic analysis method (Braun, 2022; Braun & Clarke, 2006), in which, the researcher's subjectivity is used as a resource to produce knowledge, and strategies such as inter-rater reliability or the use of codebooks are not considered to result in increased confirmability of the findings (Braun & Clarke, 2021). Reflexivity is also used as a tool in the process. Moreover, to acknowledge the role of the researchers

as active actors within the research process (ICPHR, 2022), the doctoral researcher's and the full personal characteristics of the research team, their disciplinary training, professional experience relevant to the topic, and roles within the research process were reported in Phases II (Paper II) and III (Paper IV). Additionally, decision making in the analyses processes (Paper II, III, IV) and the participatory action research study (Paper IV) were recorded by keeping notes (Coghlan & Brydon-Miller, 2014).

Confirmability refers to the extent to which the interpretations and findings by the researcher are derived from the data (Lincoln & Guba, 1985, p. 300). To allow for assessment of this criterion, theoretical, methodological, and analytical choices throughout the study have been presented (Koch, 2006) in the research articles (Paper I-IV) and the summary. Further, to increase confirmability, reflexivity, peer debriefing, and member checking were be used as strategies (Ahmed, 2024). To avoid biases and reduce subjectivity, reflexivity by writing journals to record the researcher's positionality, thoughts, feeling and reflections was used as a tool. In addition, feedback was sought from peer researchers and within the research team to increase the confirmability of the findings. As described in more detail above, participants' involvement in the interpretation of the data and findings of the sub-studies was also a vital part of the research process, increasing the confirmability of the findings. In addition, member checking of the analysis was conducted in Phase III (Paper IV) to confirm the accuracy of the findings and further refine theme development. Further considerations on the rigor of the specific sub-studies can be found in Papers I-IV.

6.3 Suggestions for future research

The findings of this study suggested that small changes in everyday practices and the environment may increase older adults' physical activity in ILTC. Being in line with the participatory approach of the study, these changes were tested by a small sample of older adults. Future research could complement these findings by experimenting on similar changes with larger samples.

The developed metaphorical model and domain-specific findings highlight the complexity of elements related to older adults' physical activity in ILTC, and various approaches that can be taken to improve physical activity promotion. Based on the findings, professionals and ILTC units could benefit from an adaptable intervention that provides tools and a process allowing an assessment-based co-development of current nursing practices and the environment to improve physical activity promotion. Future research could contribute to developing such an intervention to facilitate co-development and a change in care culture in other ILTC units.

The developed model can be used for practice, research, and policy to promote the physical activity of older adults as nursing practice using the environment in ILTC. It could be beneficial in future research to assess the model with different stakeholders, including staff members, older adults, and their family members in ILTC. Also, the model could be expanded to include the elements relating to older adults' physical activity in the domains of client, practice, and environment, in addition to depicting the overall synthesis of physical activity promotion as nursing practice using the environment. Considering the trend in Finland to transfer the provision of long-term care to community living settings instead of providing institutional long-term care (Mielikäinen & Kuronen, 2024), the model could be also tested and developed for use in other long-term care settings providing less intensive care. Furthermore, comprehensively integrating physical activity promotion into nursing practice – consistent with the comprehensive nature of nursing care (Henderson, 1978; Kim, 2010, p. 75) – would benefit from further theoretical development of the model.

6.4 Practical implications

The findings of this study have implications for nursing practice, administration and leadership, as well as policy and education. These are presented below.

Implications for nursing practice, management and leadership

The findings point to the need to redefine older adults' physical activity as a part of everyday life instead of being considered as add on activities in an otherwise passive daily life. This requires changes in the role of nurses as regards physical activity promotion, their current practices, and allocating time in nurses work schedules to promote older adults' physical activity. In addition, the different qualities of the physical, social, and symbolic dimensions of the environment could be better acknowledged as a part of older adults' physical activity promotion in nursing practice, and used for this purpose. The developed metaphorical model and other findings produced in the study can be used for these purposes.

Care culture change could be considered and addressed to produce changes in older adults' physical activity promotion as nursing practice. In this, the involvement of staff and managers plays a vital role (Forster et al., 2021). Nurses' involvement in developing their own practices and the environment can produce context fitting solutions, which may be easier to sustain in practice, than solutions implemented externally.

Managers are needed to lead the processes of producing change due to their vital role in care culture (Forster et al., 2021) and their authority (Essex et al., 2023).

Letting go of old practices can be difficult, which requires firm leadership to achieve changes (Karhulahti-Nordström et al., 2024). For such work, time for the managers to lead such processes is needed (Karppanen et al., 2025) as well as education to have sufficient competence (Karhulahti-Nordström et al., 2024).

Interprofessional collaboration between nursing staff members and rehabilitation professionals could benefit physical activity promotion and its development. This might require new kinds of use for the limited rehabilitation resources in the ILTC context.

Implications for policy makers

The findings can be used by policymakers to consider the implications of (in)sufficient physical activity promotion in ILTC for the older adults, affecting their health, functioning, wellbeing, and quality of life, when making decision about organizing care. Time is a significant component to meet the complex needs of older adults in ILTC (Hirt et al., 2024), and the findings point to the need to ensure sufficient staffing levels in ILTC to improve physical activity promotion. Supporting the functioning of older adults is a key focus of the Finnish National Programme on Ageing 2030 (Ministry of Social Affairs and Health, 2020), and based on the law ILTC should be provided promoting their functioning (Act on Supporting the Functional Capacity of the Older Population and on Social and Health Services for Older Persons 980/2012), in which physical activity plays a vital role. The findings point to the current lack of compliance with these policies.

Furthermore, the findings can be used by policymakers to consider the implications of different ILTC environments on older adults' physical activity in order to make better decisions about organizing care. Considering the physical environment, accessibility is regulated to some extent by law (Valtioneuvoston Asetus Rakennuksen Esteettömyydestä 241/2017). However, the findings point to the need for more detailed considerations being given to the quality of the environment in ILTC as regards accessibility as well as for stimulation for older adults with advanced deterioration in their health and functioning. Further policies could be considered to ensure the quality of these environments, enabling both the physical activity of the older adults but also a safe and efficient working environment for the staff. This would be also in line with the United Nations' Sustainable Development Goal of Making cities and human settlements inclusive, safe, resilient and sustainable (United Nations, 2022), and the Finnish National Programme on Ageing 2030, highlighting the importance of providing age friendly housing for older adults (Ministry of Social Affairs and Health, 2020).

In the current and expected future shortage of staff resources in ILTC (Van Aerschot et al., 2022), policy makers could consider strengthening the opportunities

of involving civil society in providing physical activities for older adults in ILTC. The findings point to the involvement of the social environment, like volunteers and family members, as a possible resource that is not currently much employed and could benefit physical activity promotion. However, increasing their involvement also requires effort and resources (Handley et al., 2022), which could be allocated to this work by policymakers.

Implications for nursing education

The findings point to the need to increase the awareness of nurses and managers about the importance of physical activity for older adults, and increasing their competences in physical activity promotion. Education to increase knowledge and skills could be integrated in basic theoretical and practical studies in vocational and bachelor level education, as well as continuing education for those already in work life.

7 Conclusions

This study produced a comprehensive understanding on the promotion of the physical activity of older adults as nursing practice using the environment. Exploring the topic together with older adults, their family members, and staff in ILTC, the study generated findings relevant to the nursing discipline. Examining the nursing metaparadigm domains of client, practice, and environment, the study generated findings on the current physical activity promotion of older adults and opportunities for improvements.

Currently, physical activity promotion in ILTC is insufficient. Older adults' physical activity levels are low, and they mostly engage in physical activity in the basic activities of daily living and independent ambulation. Older adults lack opportunities to engage in physical activities and their personal wishes are not much utilized in physical activity promotion. To improve physical activity promotion, the findings highlight the importance of nursing in the promotion of older adults' physical activity in everyday life, and interprofessional collaboration with other professionals. The findings point to the need of acknowledging and addressing the physical environment, care culture, and time as a context for older adults' physical activity and physical activity promotion. Moreover, the physical and social environments possess opportunities to activate older adults that have not been used to a large extent.

To improve older adults' physical activity promotion, a comprehensive approach, engaging nurses to improve their practices together with other professionals, involving external people, and using the environment, can provide solutions without substantive additional resources. The metaphorical model developed in this study can be used to inform nursing research and practice, as well as policy. In future research an adaptable intervention could be developed for the use of professionals in ILTC to enable assessment-based co-development of current nursing practices and the environment to improve physical activity promotion. Further theoretical development of the metaphorical model could be beneficial.

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Appendices

Appendix 1. Search strings by databases for review of literature search 1.

Search period	Database	Search string	Search results
From inception until 31.3.2025	PubMed (MEDLINE)	((("older adult*"[Title/Abstract] OR "older person*"[Title/Abstract] OR "older people"[Title/Abstract] OR elder*[Title/Abstract] OR resident*[Title/Abstract] OR "ageing population*"[Title/Abstract]) AND ("nursing home*"[Title/Abstract] OR "residential care"[Title/Abstract] OR "long-term care"[Title/Abstract])) AND (promot*[Title/Abstract] OR support*[Title/Abstract] OR maintain*[Title/Abstract])) AND (walk*[Title/Abstract] OR mobility[Title/Abstract] OR move[Title/Abstract] OR movement[Title/Abstract] OR moving[Title/Abstract] OR exercis*[Title/Abstract] OR ambulat*[Title/Abstract] OR "physical activ*"[Title/Abstract])	1399
	CINAHL	XB ("older adult*" OR "older person*" OR "older people" OR elder* OR resident* OR "ageing population*") AND XB ("nursing home*" OR "residential care" OR "long-term care") AND XB (promot* OR support* OR maintain*) AND XB (walk* OR mobility OR move OR movement OR moving OR exercis* OR ambulat* OR "physical activ*")	955
	Cochrane library	older NEXT adult* OR older NEXT person* OR older NEXT people OR elder* OR resident* OR ageing NEXT population* in Title Abstract Keyword AND nursing NEXT home* OR residential NEXT care OR long-term NEXT care in Title Abstract Keyword AND promot* OR support* OR maintain* in Title Abstract Keyword AND walk* OR mobility OR move OR movement OR moving OR exercis* OR ambulat* OR physical NEXT activ* in Title Abstract Keyword	182

Appendix 2. Search strings by databases for review of literature search 2.

Search period	Database	Search string	Search results
1.1.2021-31.3.2025	PubMed (MEDLINE)	(walk*[Title/Abstract] OR mobility[Title/Abstract] OR move[Title/Abstract] OR movement[Title/Abstract] OR moving[Title/Abstract] OR exercis*[Title/Abstract] OR ambulat*[Title/Abstract] OR "physical activ*"[Title/Abstract]) AND (environment*[Title/Abstract] OR "life space"[Title/Abstract] OR architect*[Title/Abstract] OR "Environment design"[Mesh] OR "Interior Design and Furnishings"[Mesh] OR "Facility Design and Construction"[Mesh]) AND ("older adult*"[Title/Abstract] OR "older people"[Title/Abstract] OR elderly[Title/Abstract] OR elder[Title/Abstract] OR resident*[Title/Abstract] OR "ageing population*"[Title/Abstract]) AND ("nursing home*"[Title/Abstract] OR inhouse[Title/Abstract] OR "residential care"[Title/Abstract] OR "long-term care"[Title/Abstract]) AND (english[Filter])	175
	Cinahl	XB ("older adult*" OR "older people" OR elderly OR elder OR resident* OR "ageing population*") AND ("nursing home*" OR inhouse OR "residential care" OR "long-term care") AND (environment* OR "life space" OR architect*) AND (walk* OR mobility OR move OR movement OR moving OR exercis* OR ambulat* OR "physical activ*")	156
	Cochrane library	older NEXT adult* OR older NEXT people OR elder* OR resident* OR ageing NEXT population* in Title Abstract Keyword AND nursing NEXT home* OR inhouse OR residential NEXT care OR long-term NEXT care in Title Abstract Keyword AND environment* OR life NEXT space OR architect* in Title Abstract Keyword AND walk* OR mobility OR move OR movement OR moving OR exercis* OR ambulat* OR physical NEXT activ* in Title Abstract Keyword - with Cochrane Library publication date Between Jan 2021 and Mar 2025 (Word variations have been searched)	44
	PsycInfo	XB ("older adult*" OR "older people" OR elderly OR elder OR resident* OR "ageing population*") AND XB ("nursing home*" OR inhouse OR "residential care" OR "long-term care") AND XB (environment* OR "life space" OR architect*) AND XB (walk* OR mobility OR move OR movement OR moving OR exercis* OR ambulat* OR "physical activ*")	51

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