

Article

Enhancing Dementia Nursing Homes in South Korea: Lessons from German Building Standards

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Abstract: South Korea is an aging society with a rapidly increasing number of people with dementia. In that context, this study aimed to compare dementia nursing home building standards in South Korea and Germany, based on the minimum physical and architectural requirements specified by both countries' relevant laws, to gain insights into improving South Korean building standards. I examined South Korea's Welfare of Senior Citizens Act and its Enforcement Regulations, and Germany's Federal Nursing Home Act (HeimG), Regulation on Minimum Standards for Nursing Homes (HeimMindBauV), and the corresponding state regulations. The analysis revealed differences regarding the basic requirements, facility sizes, composition of necessary rooms, and detailed regulations pertaining to these rooms. South Korea emphasized autonomy, including barrier-free and compensatory environments, as well as safety and security. Meanwhile, Germany enhanced similar aspects of autonomy to those in South Korea, including the barrier-free standard DIN 18040-2. Additionally, Germany incorporated features such as familiarity, sensory stimulation, legibility, and social interaction, reflecting aspects that offer orientational cues for autonomy. Improving South Korean building standards requires stronger regulations on the autonomy of individuals with dementia. Further, additional regulations on familiarity, sensory stimulation, legibility, and social interactions should be considered. The results provide foundational data for cross-national comparisons to establish building standards for dementia-friendly built spaces in dementia nursing homes in South Korea. Further surveys on spatial utilization, discussions, and the application of proposed improvements in Korea would contribute to enhancing the dementia-friendly nursing home design in the country.



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Keywords: dementia nursing homes; dementia-friendly design; building standards; Welfare of Senior Citizens Act; The Enforcement Regulations of the Welfare of Senior Citizens Act; HeimG; HeimMindBauV; cross-national comparison

1. Introduction

1.1. Background and Objectives

Global social, ecological, political, and economic changes have led to demographic changes such as aging populations due to declining birth and death rates and increased life expectancy [1]. Improvements in economic conditions and advancements in medicine continue to extend the average lifespan of humans, leading to a global increase in the elderly population [2]. Consequently, an increase in the number of people with dementia is expected. According to a United Nations (UN) report, the global population aged 65 years and above, which was estimated at 730 million in 2019, is projected to double to 1.5 billion by 2050 [3]. The proportion of the population aged 65 years and above is expected to increase from 6% in 1990 and 9% in 2019 to 16% by 2050 [3], suggesting a serious issue of aging. This aging problem is directly linked to an explosive increase in the number of people with dementia. Alzheimer's Disease International (ADI) has forecasted a threefold increase in this number worldwide from 2015 to 2050 (refer to Table 1). According to the World Health Organization (WHO), this number worldwide is anticipated to rise from 47 million in 2015 to 75 million by 2030 and further increase to 132 million by 2050 [4].

Table 1. Trends in the number of people with dementia globally [5].

| Year | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|------------------------------------------|-------|-------|-------|-------|-------|--------|--------|--------|
| Number of people with dementia (million) | 49.92 | 58.66 | 69.20 | 82.05 | 97.45 | 114.83 | 133.28 | 152.24 |

As part of the international effort to address dementia, the WHO designated it as a public health priority in its *Global Action Plan on the Public Health Response to Dementia 2017–2025* published in 2017 [4]. In line with this, the ADI’s 2020 report was titled *Design, Dignity, Dementia: Dementia-related Design and the Built Environment*, focusing on the protection of the dignity of people with dementia [6].

The UN has observed that given the speed of aging, South Korea is projected to have the highest increase in the proportion of the global population aged 65 years and above between 2015 and 2030 [3]. South Korea is expected to rank second in country-specific rankings of the proportion of the population aged 65 years and older by 2050 (Table 2). According to domestic research, South Korea, which is currently classified as an aged country, is expected to become a super-aged society, with the proportion of the population aged 65 years and above rising from 15.7% in 2020 to 19.9% by 2025 and 37% by 2050 (Table 3I). Concurrently, the prevalence of dementia among those aged 65 years and older in South Korea is predicted to increase from 9.36% in 2013 to 16.09% by 2050 (Table 3II). The growth rate of the number of people with dementia in South Korea is estimated to be approximately 4.5 times faster than that in other countries from 2015 to 2050 [2], with 41.2 cases of dementia per 1000 people by 2050, ranking fifth globally [7].

Table 2. Country-specific rankings of the proportion of people aged 65 and above [8].

| Year | | 1980 | 2022 | | 2050 | |
|---------|---------|------------------------------|-------------|------------------------------|-------------|------------------------------|
| Ranking | Country | People Aged 65 and Older (%) | Country | People Aged 65 and Older (%) | Country | People Aged 65 and Older (%) |
| 1 | Sweden | 16.3 | Japan | 29.8 | Hongkong | 40.6 |
| 2 | Germany | 15.7 | Italy | 23.7 | South Korea | 39.4 |
| 3 | Austria | 15.4 | Finland | 22.9 | Japan | 37.5 |
| 4 | UK | 14.9 | Portugal | 22.6 | Italy | 37.1 |
| 5 | Norway | 14.8 | Greece | 22.5 | Spain | 36.6 |
| 6 | Belgium | 14.4 | Bulgaria | 22.4 | Taiwan | 35.3 |
| 7 | Denmark | 14.4 | Puerto Rico | 22.4 | Greece | 34.8 |
| 8 | France | 14.0 | Germany | 22.2 | Portugal | 34.5 |

Table 3. Projected trends of population aging and dementia prevalence in South Korea ^{*1} [9–12], ^{*2} [13,14], ^{*3} [15], ^{*4} [2].

| Year | I. People Aged 65 or Older | | II. Dementia Prevalence Rate among Individuals Aged 65 and Above | |
|------|-----------------------------------|------------------------|------------------------------------------------------------------|------------------------------------------------------------------|
| | People Aged 65 or Older (Persons) | Population Ratio (%) | People Aged 65 or Older Living with Dementia (Persons) | Dementia Prevalence Rate among Individuals Aged 65 and Above (%) |
| 2050 | - | 37 ^{*4} (c) | 3,026,593 ^{*4} | 16.09 ^{*4} |
| 2025 | - | 19.9 ^{*4} (b) | 1,083,977 ^{*4} | 10.32 ^{*4} |
| 2020 | 8,125,000 ^{*1} | 15.7 ^{*1} (b) | 832,795 ^{*3} | 10.24 ^{*3} |
| 2019 | 7,685,000 ^{*1} | 14.9 ^{*1} (b) | 794,280 ^{*3} | 10.33 ^{*3} |
| 2018 | 7,381,000 ^{*1} | 14.3 ^{*1} (b) | 750,488 ^{*2} | 10.16 ^{*2} |
| 2017 | 7,076,000 ^{*1} | 13.8 ^{*1} (a) | 702,436 ^{*2} | 9.94 ^{*2} |

(a) Aging society, (b) Aged society, (c) Super-aged society.

Within sustainable development, addressing optimal living standards in rapidly urbanizing cities poses a paramount challenge, considering economic, ecological, social, and demographic factors [1,16]. Demographically sustainable buildings ensure safe and independent habitation for all, with a focus on accommodating the increasing elderly population, including those with dementia, while upholding human dignity [17]. Especially in South Korea, given the rapid aging and increase in dementia cases, the demand for dementia-friendly built spaces designed to accommodate this vulnerable group of individuals is urgent. Therefore, research aimed at identifying improvements in the current building standards for dementia nursing homes to promote their transformation into dementia-friendly built spaces is both multifaceted and essential.

To enhance nursing homes in South Korea, research on nursing home building standards from the perspective of dementia-friendly built spaces is needed, particularly studies comparing South Korea's standards with those of other countries. However, these studies were not sufficiently comprehensive, lacking detailed qualitative comparisons, and did not adequately explore the perspective of dementia-friendly built spaces. Previous research addressing building standards for dementia nursing homes in South Korea (median age as of 2020: 42.8 years [18]) has focused predominantly on comparisons with Japan (median age: 48 years [18]), the United Kingdom (median age: 39.5 years [18]), the United States (median age: 37.5 years [18]), and Australia (median age: 36.7 years [18]), [19–22]. These studies were limited in number and scope, providing only a general overview within a restricted framework. Studies conducted by the South Korea Health Industry Development Institute [23] and Jin Young-ran [24] contained more detailed analyses of building standards, focusing on Japan, the United States, and Australia, but did not sufficiently reflect the perspective of dementia-friendly built spaces. In a comparative previous study with Germany (median age: 44.9 years [18]), the approach was more general, with a focus only on the minimal net floor area for bedrooms [25].

Therefore, this study targets the legal building standards specified in the current laws of South Korea and Germany. South Korea entered the aged society phase around 2018 and is set to become a super-aged society by 2025. By contrast, Germany, as a representative super-aged society, transitioned to this demographic phase in 1972 and to a super-aged society only in 2007 [26]. Germany is among the G7 countries with a highly advanced social welfare system, and it is also an aging society [27,28]. As of 2019, it ranked seventh globally in terms of the number of dementia patients (1,691,221 individuals), and it is projected to rank ninth by 2050 (2,796,783 individuals), making it a high-risk country for dementia [29,30]. Also, the consistently high ranking in the proportion of elderly individuals places Germany at the forefront of aging societies in the EU. The percentages of individuals aged 65 years and above in Germany compared to the EU average over the last few decades are as follows: 2000: 17% (EU-27: 15.6%), 2010: 21% (EU-27: 17.6%), and 2020: 22% (EU-27: 20.7%) [31,32]. Along with that, Germany responded proactively to dementia policies in 2020 by developing National Dementia Plans (NDPs), which include action plans for creating a safe environment for people with dementia, improving residential settings, and introducing alternative housing models [33]. For these reasons, Germany is an apt candidate for comparison for the purposes of this study. Accordingly, this study is a foundational research that aims to compare the current building standards for dementia nursing homes in South Korea with those in Germany, revealing the differences and implications by analyzing the basic requirements, facility sizes, necessary rooms and detailed regulations to these rooms as indicated by the current standards in both countries.

1.2. Research Methods

To illustrate disparities between building standards in South Korea and Germany, and provide insights into South Korea's standards, the first chapter explores contextual background including dementia data, concepts of dementia-friendly spaces, and nursing homes in both countries. This is accomplished by utilizing preceding studies on dementia and dementia-friendly built spaces, as well as statistical data and preceding studies related

to the current status of nursing homes in South Korea and Germany, along with regulatory information. Then, the following chapter analyzes the current laws related to dementia nursing homes in South Korea and Germany. A previous comparative study with Germany focused solely on the Federal Nursing Home Act in Germany, with only a brief mention of the minimal net floor area for bedrooms [25]. In contrast, this analysis encompasses the South Korean Welfare of Senior Citizens Act [34] and its subsidiary Enforcement Regulations [35], as well as the German Nursing Homes Act (HeimG) [36] and its subsidiary Regulation on Minimum Standards for Nursing Homes (HeimMindBauV) [37], along with 10 German state laws. The legal and building standard data were collected from various sources, including the internet, government websites, documents, research papers, and reports. Using these data, relevant building standards in both South Korea and Germany were meticulously analyzed. For South Korea, building standards from the 1990s up to the most recent revisions in 2022 were examined, while for Germany, the focus was on the current revisions building standards set by both the federal and state governments. Finally, in the context of dementia-friendly spaces, the last chapter compares and analyzes the key aspects of building standards in both countries, detailing basic requirements, facility sizes, the composition of necessary rooms, and specific regulations related to these rooms. In this chapter, the analysis specifically focuses on regulatory data derived from the Enforcement Regulations of the Welfare of Senior Citizens Act in South Korea, and the Regulation on Minimum Standards for Nursing Homes (HeimMindBauV), as well as ten state laws in Germany that adhere to substantive building standards. The preceding research data on the utilization status of nursing homes in South Korea are also utilized to reflect the actual environment of nursing homes.

2. Background Status

2.1. Dementia and the Concept of Dementia-Friendly Built Space

2.1.1. Symptoms of Dementia

The term “dementia” is derived from the Latin words “*de* (out of) + *mens* (mind) + *ia* (state of)”, signifying a state of being out of the mind [33]. According to the WHO’s International Classification of Diseases, 10th edition (ICD-10), dementia is defined “as a syndrome resulting from chronic or progressive diseases of the brain, characterized by a multitude of disorders in higher cortical functions, including memory, thinking, orientation, comprehension, calculation, learning ability, language, and judgment” [38]. Individuals with dementia exhibit a decline in overall cognitive and intellectual functions, and Alzheimer’s disease, accounting for 50–60% of dementia cases, is associated with a broad range of cognitive, behavioral, and daily living ability changes (Table 4).

Table 4. Disorders in the elderly with dementia (adapted from [39]).

| Disorder | | Associated Symptoms |
|---------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Behavior-psychological disorder | Cognitive disorder | Memory disorder, orientation disorder, language disturbance, space–time perceptual disturbance, agnosia, apraxia, prefrontal functional disorders causing judgment disorder |
| | Behavior disorder | Aggression, wandering without meaning, inappropriate sexual behavior, screaming, cursing, insomnia, bulimia |
| | Psychological disorder | Anxiety, agitation, apathy, insensibility, depression, hallucination, delusion |
| Changes in activities of daily living | Changes in P-ADL ¹ | Defecating, dressing, bathing, etc. |
| | Changes in I-ADL ² | Shopping, money management, household, food preparation, etc. |

¹ Physical activities of daily living, ² Instrumental activities of daily living.

2.1.2. Dementia Nursing Homes as Dementia-Friendly Built Spaces

Research on dementia nursing homes has emphasized design concepts from a therapeutic environmental perspective since the 1980s. Concepts such as therapeutic physical environments [40], therapeutic goals [41,42], therapeutic buildings [43], environment as treatment [44], and therapeutic architecture [45] have been central to describing spaces for individuals with dementia. Since the 2000s, the design concept of therapeutic environments for individuals with dementia has evolved into terms such as dementia-friendly architecture [46,47] and dementia-sensitive built spaces [16,48]. The design criteria for dementia-friendly architecture are classified by Marquardt into five categories (autonomy, familiarity, sensory stimulation, legibility, and social interaction) and are implemented through three design principles each, as shown in Table 5.

Table 5. Criteria and design principles of dementia-friendly architecture (adapted from [47]).

| Criteria | I. Autonomy | II. Familiarity | III. Sensory Stimulation | IV. Legibility | V. Social Interaction |
|-------------------|----------------------------------------|-----------------------------|------------------------------|-----------------------|-----------------------|
| Design principles | Barrier-free, compensatory environment | Biographical reference | Encouragement | Logical room syntax | Privacy |
| | Safety and security | Homogenous and small groups | Avoidance of overstimulation | Furnishing | Belonging |
| | Orientational cues | Noninstitutional character | Fixtures and fittings | Fixtures and fittings | Communication |

2.2. Dementia Nursing Homes in South Korea

The first senior nursing home in South Korea, established in 1981 through the enactment of the Welfare of Senior Citizens Act, was a public nursing home aimed at providing free or partially subsidized meals, treatment, and other amenities for seniors in need of caregiving [34]. Private fee-based elderly nursing homes were legalized in 1989. In 1997, an amendment to the same law introduced specialized public and private nursing homes for seniors with dementia, stroke, or other severe conditions. At that time, public specialized nursing homes offered inmates daily necessities at either no cost or reduced fees [34]. Meanwhile, private specialized nursing homes collected all associated costs from residents. But, with subsequent legal revisions in 2007, the five types of facilities, that is, public and private nursing homes as well as specialized nursing homes, were ultimately integrated into a single type for seniors with conditions such as dementia and stroke. This integration was in line with the implementation of the long-term care insurance system that began in 2008 and has been effective to date. Furthermore, through a legal revision in 2016, it became mandatory to establish dementia units in nursing homes specializing in dementia care, aimed at providing tailored care for individuals with dementia. This involved either installing dementia units in some nursing homes or converting the nursing homes themselves into dementia-specific ones.

As of 2019, there were 772,430 recipients of long-term care benefits for older adults [49]. Among them, 28.3% (218,240) received facility-based care, whereas 71.7% (554,190) opted for outpatient care [49]. The number of elderly nursing homes at the time was 3604 (with a capacity of 174,634), and elderly care group homes numbered 1939 (with a capacity of 17,065) [49]. The operational structure of elderly nursing homes was dominated by private establishments (2303 facilities), followed by corporate-run facilities (1188), local government facilities (104), and others (9) [49]. According to the current Welfare of Senior Citizens Act, facilities accommodating residents with conditions such as dementia and stroke are categorized as elderly nursing homes. Residents of these nursing homes include patients with Alzheimer's dementia, numbering 56,000 individuals, which constitutes 63% of the total number of people with Alzheimer's dementia [50].

2.3. Dementia Nursing Homes in Germany

In Germany, elderly nursing homes originated from almshouses (Spitäler) built near churches and monasteries in the early modern period, providing a place to sleep and care for the seniors, sick, and impoverished [51]. Toward the end of the 19th century, independent elderly nursing homes emerged, replacing these earlier institutions [51]. In the aftermath of World War II, during the economic reconstruction periods of the 1950s and 1960s, a significant number of elderly nursing homes were established [51]. The Federal Nursing Homes Act (HeimG) was enacted in 1974 and regulated the rights of facilities for older people, adults in need of care, or disabled adults. After more than 20 years of active discussions recognizing the need for independent long-term care, the long-term care insurance system (Pflegeversicherung) was introduced in 1995 as the first of its kind in the world [52]. The Nursing Homes Act lost its significance due to a constitutional amendment in 2006 (Federalism Reform I) and the associated transfer of legislative authority from federal law to state laws [52]. Starting in 2008, all federal states gradually established regulations regarding the Nursing Homes Act. As of 2019, the number of long-term care users in Germany was 4.12 million, with 80% (3.3 million) utilizing outpatient care (ambulante Pflegedienst), four times the 20% (810,000) who opted for facility-based care [53]. The utilization rate of facility-based care is slightly lower compared to Korea. There were 15,380 operating facility institutions in 2019 [54], which were more than three times the quantity compared to Korea. Among residents aged 65 and older in elderly care facilities, the prevalence of dementia was reported as 50% [55] or 69% [56], with the dementia rate rising to 64.3% among those aged 75 and older [57].

3. Current Legislation on Dementia Nursing Homes in South Korea and Germany

In South Korea, the current legislation governing dementia nursing homes for elderly residents is rooted in the welfare-oriented Welfare of Senior Citizens Act, established in 1981, along with its subsidiary legislation, the Enforcement Regulations of the Welfare of Senior Citizens Act, which was enacted in 1982. In Germany, the legal framework is centered on the Federal Nursing Homes Act (HeimG, 1974) and its subsidiary legislation, the Regulation on Minimum Standards for Nursing Homes (HeimMindBauV, 1978). Germany operates under a continental legal system with a federal structure comprising 16 states forming the Federal Republic of Germany, which is divided into federal law and state laws. The Federal Nursing Homes Act serves as the foundation for state-specific Nursing Home Acts, and the Federal Regulation on Minimum Standards for Nursing Homes guides state-specific Regulations on Minimum Standards for Nursing Homes (Table 6). State laws in Germany vary in nomenclature across states according to each one’s characteristics.

Table 6. Current legal frameworks for elderly nursing homes in South Korea and Germany.

| South Korea | | Germany | |
|--------------|-------------------------------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| | | Federal Law (Bundesgesetz) | State Law (Landesgesetz) |
| Superior law | Welfare of Senior Citizens Act | Nursing Homes Act (Heimgesetz: HeimG) | State law for Nursing Home Act * (Länderheimgesetze) |
| Inferior law | The Enforcement Regulations of the Welfare of Senior Citizens Act | Regulation on Minimum Standards for Nursing Homes (Heimmindestbauverordnung: HeimMindBauV) | State law for Regulations on Minimum Standards for Nursing Homes * (Heimmindestbauverordnung der Bundesländer) |

* Different names in each state.

3.1. Relevant Laws in South Korea

3.1.1. Superior Law: Welfare of Senior Citizens Act

The classification system and definitions outlined divide elderly nursing homes into the upper category of elderly welfare facilities and middle category of elderly medical welfare facilities [34]. These facilities are defined as establishments that admit seniors with

significant mental and physical disabilities resulting from conditions such as dementia, stroke, and other geriatric illnesses [34] (Table 7I). Dementia is defined as an acquired composite disorder that affects a person's daily life due to a degenerative brain disorder or cerebrovascular disease, resulting in the deterioration of faculties, such as memory, language, orientation, judgment, and performance [58]. Geriatric diseases, as classified by the South Korean Standard Classification of Diseases, include Alzheimer's disease, intracranial hemorrhage, cerebral infarction, other cerebrovascular diseases, Parkinson's disease, post-stroke sequelae, and other degenerative diseases of the basal ganglia [59]. Consequently, residents of South Korean elderly nursing homes are limited to seniors suffering from major geriatric diseases such as dementia and stroke. The nursing homes are further categorized into those accommodating more than 10 residents and those with between 5 and 9 residents, known as elderly care group homes [34].

Table 7. Comparison of laws related to nursing homes in South Korea.

| Regulation | Legal Provisions | | Main Contents | |
|-----------------------------------------------------------------------|------------------|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I. Welfare of Senior Citizens Act | Art. 31 | Types of elderly welfare facilities | Upper classification: Welfare facilities for the elderly Middle classification: Medical welfare facilities for the elderly Subclassification: Elderly nursing homes | |
| | Art. 34(1) | Elderly medical welfare facilities | Definition of elderly nursing home: Facility that accommodates seniors with significant mental and physical disabilities arising from conditions such as dementia, stroke, and other geriatric illnesses, and provides meals, care, and other necessities of daily life | |
| II. The Enforcement Regulations of the Welfare of Senior Citizens Act | Art. 22(1) | Building standards of medical welfare facilities for the elderly | Common matters | Facility size, structure, and equipment |
| | | | Facility standards | Necessary rooms: Bedroom, kitchen, dining room, washroom, bathroom, program room, physical (occupational) therapy room, medical/nursing room, and other rooms |
| | | | Facility equipment standards | Facility equipment for necessary rooms |

3.1.2. Inferior Law: The Enforcement Regulations of the Welfare of Senior Citizens Act

The subordinate law specifies detailed provisions on common matters, facility standards, and equipment standards required for the accreditation of elderly nursing homes and elderly care group homes through building standards for elderly medical welfare facilities (Table 7II).

3.2. Relevant Laws in Germany

3.2.1. Superior Law: Nursing Homes Act and State Laws

In the German Federal Nursing Homes Act, the scope of the law encompasses paid nursing homes (Heime) that provide care services, such as residence, care, and meals, to the elderly and adults in need of care or with disabilities [36]. It comprehensively describes some necessary rooms [36] (Table 8I). Based on the Nursing Homes Act, individual states in Germany have legislated their own primary care laws, outlining the law's purpose and also extending its application to nursing homes and various other facility types of ambulatory shared care homes and assisted living facilities (Table 8II).

Table 8. Legislation on nursing homes in Germany (1): HeimG and state laws.

| | | | Legal Provisions | Main Contents |
|------------------------------------------|-----------|-----------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I. Nursing Homes Act (HeimG) | | | Art. 1 | Scope of application |
| | | | | Nursing homes (Heime) that provide a residential space, medical care, and meals to the elderly or adults who need care or are disabled |
| | | | Art. 3(2) | Performance |
| | | | | Necessary rooms: Residential space, treatment spaces, household management spaces, corridor, bathrooms and toilets/Sanitary and technical equipment |
| II. State laws for the Nursing Homes Act | | | | |
| State | State law | | Legal provisions | Scope of application |
| 1 | BW | WTPG [60] | Art. 2–6 | For adults in need of care or with disabilities: Nursing home (1), ambulatory assisted living community (3A) |
| 2 | Bay | PfleWoqG [61] | Art. 2 | For seniors or adults in need of care: Nursing home (1), ambulatory assisted living community (3A), special housing form (6C), assisted living group (5A) |
| 3 | Berl | WTG [62] | Art. 2–7 | For adults in need of care or with disabilities: Nursing home (1), care facility (2A), assisted living community (5B), special housing form (6C) |
| 4 | Ham | HmbWBG [63] | Art. 2 | For seniors or adults in need of care or with disabilities: Service housing facility (7A), living community (8), assisted living community (5C), residential facility (9), guest facility (10), ambulatory services (4E) |
| 5 | Hess | HGBP [64] | Art. 2 | For seniors or adults in need of care or with disabilities: Ambulatory care and nursing services (4D) |
| 6 | MV | EQG [65] | Art. 2 | For seniors or adults in need of care, as well as those with mental health issues or disabilities: Day and night care (11), ambulatory assisted living community (3A), training living groups for individuals with mental health challenges (12) |
| 7 | NW | WTGNW [66] | Art. 2–5 | For seniors or adults in need of care or with disabilities: Facility with comprehensive service offerings (13B), residential community with care services (5D), serviced living (7B), ambulatory services (4E), guest facility (10) |
| 8 | RP | LWTG [67] | Art. 3–6 | For seniors or adults in need of care or with disabilities: Facility with increased self-determination and participation (13A), facility with comprehensive service offerings (13B), self-determined living community (5F) |
| 9 | Sach | SächsBeWoG [68] | Art. 2 | For seniors or adults in need of care, as well as those with mental health issues or disabilities: Nursing home (1), ambulatory assisted living community (3A), assisted living group (5A) |
| 10 | SH | SbStG [69] | Art. 6–10 | For adults in need of care or with disabilities: Nursing home (1), special forms of housing, care, and support (14), assisted living (6A), ambulatory supported residential and house community (3B) |
| 11 | BB | BbgPBWoG [70] | Art. 1, 4, 5 | For adults in need of care or with disabilities: Supported housing (6B), housing with limited self-responsibility (6D) |
| 12 | BR | BremWoBeG [71] | Art. 2, 5, 7–9 | For seniors or adults in need of care or with disabilities: Guest facility (10), mobile support services (4F), serviced living (7B), living community with support services (5G), care and support facility (2B) |
| 13 | NS | NHeimG [72] | Art. 1 | For seniors or adults in need of care or with disabilities: Non-self-determined living communities (5E), assisted living (6A) |
| 14 | Sar | LHeimGS [73] | Art. 1 | For adults in need of care or with disabilities: Nursing home (1), ambulatory assisted living (4A), ambulatory care services (4C) |

Table 8. Cont.

| II. State laws for the Nursing Homes Act | | | | |
|------------------------------------------|-----------|------------------|----------------------|---------------------------------------------------------------------------------------------------------------------|
| State | State law | Legal provisions | Scope of application | |
| 15 | SA | WTG-LSA [74] | Art. 2–4 | For seniors or adults in need of care or with disabilities: Nursing home (1), non-self-organized housing forms (6E) |
| 16 | Tuer | ThürWTG [75] | Art. 1–3 | For seniors or adults in need of care or with disabilities: Nursing home (1), ambulatory care housing forms (4B) |

BW (Baden-Württemberg); Bay (Bavaria); Berl (Berlin); Ham (Hamburg); Hess (Hesse); MV (Mecklenburg-Vorpommern); NW (Nord Rhine-Westphalia); RP (Rhineland-Palatinate); Sach (Saxony); SH (Schleswig-Holstein); BB (Brandenburg); BR (Bremen); NS (Lower Saxony); Sar (Saarland); SA (Saxony-Anhalt); Tuer (Thuringia). (1) Stationäre Einrichtungen; (2A) Pflegeeinrichtungen; (2B) Pflege- und Betreuungseinrichtungen; (3A) Ambulant betreute Wohngemeinschaften; (3B) Ambulant betreute Wohn- und Hausgemeinschaften; (4A) Ambulant betreuten Wohnens; (4B) Ambulant betreute Wohnformen; (4C) Ambulante Pflegedienste; (4D) Ambulante Betreuungs- und Pflegedienste; (4E) Ambulante Dienste; (4F) Mobile Unterstützungsdienste; (5A) Betreute Wohngruppe; (5B) Betreute Wohngemeinschaften; (5C) Wohnassistentengemeinschaften; (5D) Wohngemeinschaften mit Betreuungsleistungen; (5E) Nicht selbstbestimmte Wohngemeinschaften; (5F) Selbstbestimmte Wohngemeinschaften; (5G) Wohngemeinschaften mit Unterstützungsleistungen; (6A) Betreutes Wohnen; (6B) Unterstützter Wohnform; (6C) Besondere Wohnform; (6D) Wohnformen mit eingeschränkter Selbstverantwortung; (6E) Nicht selbstorganisierte Wohnform; (7A) Servicewohnanlagen; (7B) Service Wohnen; (8) Wohngemeinschaften; (9) Wohneinrichtungen; (10) Gasteinrichtungen; (11) Tages- und Nachtpflege; (12) Trainingswohngruppen; (13A) Einrichtungen mit höherer Selbstbestimmung und Teilhabe; (13B) Einrichtungen mit umfassendem Leistungsangebot; (14) Besonderen Wohn- Pflege und Betreuungsform.

3.2.2. Inferior Law: Regulation on Minimum Standards for Nursing Homes and State Laws

The building standards for German nursing homes are detailed through the Federal Nursing Homes Act's sublaw, the Federal Regulation on Minimum Standards for Nursing Homes, according to which nursing homes are classified into three types: elderly nursing homes (Altenheim), elderly residential homes (Altenwohnheim), and adult nursing homes (Pflegeheim fuer Volljährige). Building standards are categorized into general regulations that are simultaneously applied to all three types, as well as specific regulations applied to each type (Table 9I). Among the 16 federal states, 10 autonomously legislate and enforce their own regulations based on the Regulation on Minimum Standards for Nursing Homes (Table 9II). Starting with Hesse in 2010, followed by Mecklenburg-Vorpommern (2010), Baden-Wuerttemberg (2011), Bavaria (2011), Schleswig-Holstein (2011), Hamburg (2012), Berlin (2013), Rhineland-Palatinate (2013), Nord Rhine-Westphalia (2014), and Saxony (2014), the states have implemented regulations for nursing homes. Meanwhile, the remaining six states continue to apply the federal regulation directly, as their own state laws have not yet been enacted.

Table 9. Legislation on nursing homes in Germany (2): HeimMindBauV and state laws.

| Regulation | | Legal Provisions | | Main Contents | | | |
|---------------------------------------------------------------------|-------------------|----------------------|---------------------|----------------------------------------------------------------------|---------------|-------|--------------|
| I. Regulation on Minimum Standards for Nursing Homes (HeimMindBauV) | Art. 1–18 | Minimum requirements | Common regulations | Scope of application | | | Art. 1 |
| | | | | Residential rooms, care rooms | | | Art. 2 |
| | | | | Corridors, stairs, elevators, floor, lighting | | | Art. 3–6 |
| | | | | Emergency alarm devices, phones, exits | | | Art. 7–9 |
| | | | | Sanitary equipment, household space | | | Art. 10–11 |
| | | | Special regulations | Heating, building entrance | | | Art. 12–13 |
| | | | | Residential room, functional auxiliary room | | | Art. 14–15 |
| | | | | Common areas, treatment room | | | Art. 16–17 |
| | | | | Sanitary equipment | | | Art. 18 |
| | | | | II. State laws for Regulation on Minimum Standards for Nursing Homes | | | |
| State | State law | State | State law | State | State law | State | State law |
| BW | LHeimBauVO [76] | Bay | APfleWoqG [77] | Berl | WTG-BauV [78] | Ham | WBBauVO [79] |
| Hess | HGBPAV [80] | MV | EMindBauVOMV [81] | NW | WTGDVO [82] | RP | LWTGDVO [83] |
| Sach | SächBeWoGDVO [84] | SH | SbStG-DVO [85] | BB | - | BR | - |
| NS | - | Sar | - | SA | - | Tuer | - |

4. A Comparison of Building Standards for Dementia Nursing Homes in South Korea and Germany

As discussed in Section 3, the current laws in South Korea and Germany regarding the building standards for dementia nursing homes are primarily outlined in South Korea's Enforcement Regulations of the Welfare of Senior Citizens Act and Germany's Regulation on Minimum Standards for Nursing Homes (HeimMindBauV), a sublaw under the Nursing Homes Act, along with the Minimum Building Regulations of the individual federal states.

4.1. Regulations Regarding Basic Requirements for Dementia Nursing Homes

4.1.1. South Korea

The two countries' building standards specify 11 basic requirements for dementia nursing homes. Six of these requirements are specified in South Korea's building standards: a barrier-free environment, safety lock devices, light, thermal heating system, indoor ventilation, and community interactions (Tables 10I and 11I). They emphasize mobility, safety, and health and sanitation facilities, and can be traced back to the revised building standards in 1998, which emerged with the legal establishment of specialized nursing homes for dementia patients in 1997. In other words, most of these basic requirements of specialized nursing homes have largely remained unchanged since 1998 to the present day. Upon closer examination, this continuity follows the integration of five types of nursing homes into the current unified structure in 2007, coinciding with the implementation of Long-Term Care Insurance for the Elderly in 2008, prompted by South Korea's aging population. In 2016, regulations mandated entrance doors at dementia unit entrances to separate spaces and allow emergency access. This measure aimed to ensure the stability and safety of elderly individuals with dementia, meeting their specific needs.

Table 10. Comparison of the basic requirements for dementia nursing homes.

| Basic Requirements | (A) Barrier-Free Environment | (B) Safety Lock Device | (C) Light | | (D) Thermal Heating System | (E) Indoor Ventilation | (F) Spatial Orientation | (G) Home-like Environment | (H) Personal Belongings and Furniture | (I) Emergency Alarm Communication Device | (J) Protected Outdoor Space | (K) Community Interaction |
|----------------------------|------------------------------|------------------------|-----------|----------|----------------------------|------------------------|-------------------------|---------------------------|---------------------------------------|------------------------------------------|-----------------------------|---------------------------|
| | | | Daylight | Lighting | | | | | | | | |
| I. South Korea | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - | - | - | ○ |
| II. Germany | | | | | | | | | | | | |
| HeimMindBauV (federal law) | ○ | ○ | - | ○ | ○ | - | - | - | - | ○ | - | - |
| BW | ○ | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | ○ | - |
| Bay | ○ | - | - | - | - | - | - | - | - | ○ | - | - |
| Berl | ○ | ○ | - | ○ | ○ | - | - | - | - | ○ | - | - |
| Ham | ○ | - | ○ | ○ | - | - | ○ | ○ | - | ○ | ○ | - |
| Hess | ○ | ○ | ○ | ○ | ○ | - | - | - | ○ | ○ | ○ | - |
| MV | ○ | - | - | - | - | - | - | - | - | ○ | - | - |
| NW | - | - | ○ | - | ○ | - | - | - | - | ○ | ○ | - |
| RP | - | - | - | - | ○ | - | ○ | - | ○ | ○ | ○ | - |
| Sach | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - |
| SH | ○ | - | - | - | ○ | - | - | ○ | ○ | ○ | ○ | - |

○: Regulations for basic requirement exist.

Table 11. Comparison of the details of the basic requirements for dementia nursing homes.

| Basic Requirements | | | I. South Korea | II. Germany |
|--------------------|-------------------------------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A-1 | Stairs, steps | ■ | Gradual stairs. | ■ Entrance and hallway are level (1). ■ Sloped if height difference (1). |
| A-2 | Corridor width | | | ■ Ensuring the mobility of the bed (1). |
| A-3 | Anti-slip floor | ■ | Soft and non-slippery flooring. ■ Non-slip floors in corridors, bedrooms, toilets, washrooms, and bathrooms. | ■ Prevent slipping in living space and hallway (1). |
| A-4 | Elevator | ■ | Passenger elevators or ramps. | ■ Elevator needed: minimum one location (1). |
| A-5 | Wheelchair usability | ■ | Allow wheelchair access: corridor, bedrooms, bathrooms, and toilets. ■ No thresholds between the corridor, bedrooms, and bathroom. | ■ Allow wheelchair access: bathrooms and toilets (1). |
| A-6 | Safety handle | ■ | Safety handles in the hallway, bedrooms, and bathrooms. ■ Move freely on and off the bed. ■ Safety equipment around the bed. ■ Auxiliary rods and vertical pillars for bathtub. | ■ Safety handles on both sides of the hallway (1), and around bathtubs, showers, and toilets (1). ■ Bathtub entry safety (1). |
| A-7 | Barrier-free standard specification | | | ■ Statements of German barrier-free standards (2, 3, 4, 5, 6, 10, 11). |
| B-1 | Outside entrance | ■ | Door-lock device. ■ Automatically opens during emergencies like fires. | |
| B-2 | Stairs | ■ | A lock on the door of the stairs. ■ Automatically opens during emergencies like fires. | |
| B-3 | Living room, bedroom, and bathroom | | | ■ Emergency doors openable from outside: common areas, bedrooms, toilets (1, 4, 6, 10). |
| B-4 | Dementia unit | ■ | Install emergency doors for fire safety. | |
| B-5 | Kitchen | ■ | Install lockable doors in kitchens for fire safety. | |
| C-1 | Daylight | ■ | Consider daylight for health and hygiene. ■ At least 1/7 th of the bedroom floor area should be windows. ■ Daylight suitable in bedroom. | ■ Use daylighting (2). ■ Window to allow a view from bed (7). ■ Sunlight control devices in bedrooms, residence, and treatment spaces (4). ■ Avoid facing north (7). |
| C-2 | Lighting | ■ | Night lights in corridors and toilets. ■ Lighting suitable for bedrooms. | ■ Lighting suitable for the residents' needs (2). ■ Even and bright lighting (2). ■ Adequate, uniform, glare-free lighting always (4). ■ Night lights on stairs and in corridors (1). ■ Residents cannot turn off corridor lighting (4). ■ Reading lights in bedrooms and common living rooms (1,4). ■ Adjust room lighting from bed (4). ■ Night lights for night care (4). |
| D-1 | Heating system | ■ | Consider heating for health and hygiene. ■ Heating suitable for bedrooms. | ■ Proper heating and temperature throughout all rooms, corridors, toilets, bathrooms, and stairs (1). ■ An indoor climate suitable for residents' needs (2). |
| E-1 | Ventilation | ■ | Consider ventilation for health and hygiene. ■ Ventilation suitable for bedrooms. | ■ Exhaust facilities suitable for residents' needs (2). |
| F-1 | Space arrangement | | - | ■ Consider visual perception decline due to aging and dementia for better understanding of room functions (5). ■ Spatial orientation support for residents (2,10). ■ Central living room and kitchen layout visible at a glance (5). ■ Bedroom layout mimics typical household bathroom placement and design (5). |

Table 11. Cont.

| Basic Requirements | | I. South Korea | II. Germany |
|--------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| F-2 | Orientation element | - | <ul style="list-style-type: none"> ■ Safe navigation cues for finding personal spaces (5). ■ Auxiliary elements for spatial orientation in corridors, staircases, and elevators (9). |
| G-1 | Size of the space | | <ul style="list-style-type: none"> ■ Common living room size reflects personal unit characteristics (5). |
| G-2 | An atmosphere like home | | <ul style="list-style-type: none"> ■ Residential unit simulates a home-like environment (11, 2). ■ A private atmosphere (10). ■ Amplifying personal feelings through space arrangement, usage characteristics, and decorations suitable for age group of typical houses (5). ■ Organize the decoration of bedroom with residents (11). ■ Common living room decoration reflects personal unit characteristics (5). |
| H-1 | Past personal belongings | | <ul style="list-style-type: none"> ■ Use familiar furniture, belongings, and decorations in the bedroom (2, 6, 9, 10). |
| I-1 | Alarm device | | <ul style="list-style-type: none"> ■ An alarm on all beds (1, 3, 4, 8). ■ Alarm devices at an appropriate level in bedrooms, toilets, rest areas, treatment spaces, and public areas (3, 4, 5, 6, 9, 10, 11). |
| I-2 | Communication device | | <ul style="list-style-type: none"> ■ At least one telephone line throughout the facility (1). ■ Radio, TV, phone, internet communication (3, 4, 6, 7, 9, 11). |
| J-1 | Outdoor space Access | | <ul style="list-style-type: none"> ■ Always be accessible (5). ■ Connected to central common living room (5). |
| J-2 | Outdoor space safety | | <ul style="list-style-type: none"> ■ Residents must remain safe at all times (5). ■ Exclude outdoor spaces accessible to outsiders from the surrounding environment (9). |
| J-3 | Self-use of outdoor spaces | | <ul style="list-style-type: none"> ■ Residents have independent access to outdoor spaces (11). ■ Wheelchair users have independent use (8, 10, 2). |
| J-4 | Adequate outdoor space | | <ul style="list-style-type: none"> ■ Sufficient size (2, 6, 9, 10). |
| J-5 | Solar control device in outdoor spaces | | <ul style="list-style-type: none"> ■ Such as shades and parasols (5). |
| K-1 | Additional cultural and sports facilities | <ul style="list-style-type: none"> ■ Such as libraries, and sports and recreation facilities. ■ Open but not intrusive to residents. | |
| K-2 | Day and night care facility | <ul style="list-style-type: none"> ■ Such as day and night care services for seniors | |

(1) HeimMindBauV (federal law); (2) BW; (3) Bay; (4) Berl; (5) Ham; (6) Hess; (7) MV; (8) NW; (9) RP; (10) Sach; (11) SH.

4.1.2. Germany

In Germany's building standards, similar to South Korea, five common requirements focusing on mobility, safety, health, and sanitation facilities are included. Additionally, Germany adds specifically the barrier-free standard DIN18040-2:2011-9 [86]. Beyond these, five more items are regulated, encompassing emergency alarm and communication devices, spatial orientation, creating homelike environments, managing personal belongings and furniture, as well as providing protected outdoor spaces (Tables 10II and 11II). Except for emergency alarm and communication devices, these items have been gradually integrated

into the new state building standard, including the barrier-free standard. This transition was a result of the federalism reform in 2006, where federal government regulations shifted to state regulations [87], leading to the establishment of state building standards between 2010 and 2014. Consequently, since 2010, state-level measures have been implemented to address wandering issues and create a more home-like environment in facilities, with a focus on enhancing emotional stability for elderly individuals with dementia. State building standards have increasingly emphasized dementia-friendly design principles since 2010, surpassing previous federal standards.

4.1.3. Summary

The results indicate that South Korean building standards have emphasized specific principles supporting dementia patient autonomy and fostering social interaction within community contexts since 1998 (Table 12). Notably, certain standards present in German state building regulations since 2010, such as the barrier-free standard DIN18040-2:2011-9, are absent in South Korea. These standards, particularly within the autonomy criterion, promote principles of barrier-free and compensatory environmental design.

Table 12. Design criteria inherent in the basic requirements for dementia nursing homes.

| Design Criteria | I. Autonomy | | | II. Familiarity | | | III. Sensory Stimulation | | | IV. Legibility | | | V. Social Interaction | | |
|-----------------|-------------------------------------------|---------------------|----------------|------------------------|----------------|----------------------------|--------------------------|------------------------------|------------------------|---------------------|----------------|-----------------------|-----------------------|----------------|----------------|
| | I-1 | I-2 | I-3 | II-1 | II-2 | II-3 | III-1 | III-2 | III-3 | IV-1 | IV-2 | IV-3 | V-1 | V-2 | V-3 |
| | Barrier-Free and Compensatory Environment | Safety and Security | Oriental Cues | Biographical Reference | Small Groups | Noninstitutional Character | Encouragement | Avoidance of Overstimulation | Access to the Outdoors | Logical Room Syntax | Furnishing | Fixtures and Fittings | Privacy | Belonging | Communication |
| (A) | ○ ^{1,2} | ○ ^{1,2} | - | - | - | - | - | - | - | - | - | - | - | - | - |
| (B) | - | ○ ^{1,2} | - | - | - | - | - | - | - | - | - | - | - | - | - |
| (C) | ○ ^{1,2} | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| (D) | ○ ^{1,2} | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| (E) | ○ ^{1,2} | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| (F) | - | - | ○ ² | - | - | - | - | - | - | ○ ² | - | - | - | - | - |
| (G) | - | - | - | - | ○ ² | ○ ² | - | - | - | - | - | - | ○ ² | ○ ² | - |
| (H) | - | - | - | ○ ² | - | ○ ² | - | - | - | - | ○ ² | - | ○ ² | - | - |
| (I) | ○ ² | ○ ² | - | - | - | - | - | - | - | - | - | - | - | - | - |
| (J) | ○ ² | ○ ² | - | - | - | - | - | - | ○ ² | ○ ² | - | - | - | - | - |
| (K) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ○ ¹ |

(A) Barrier-free-like environment; (B) Safety lock device; (C) Light; (D) Thermal heating system; (E) Indoor ventilation; (F) Spatial orientation; (G) Home-like environment; (H) Personal belongings and furniture; (I) Emergency alarm and communications device; (J) Protected outdoor space; (K) Community interaction. ¹ South Korea, ² Germany. ○: Regulations for basic requirement exist.

Furthermore, Germany enhances patient autonomy by providing detailed guidelines on emergency alarm and communication devices, as well as spatial orientation for better wayfinding. Apart from autonomy, Germany addresses aspects that enrich the familiarity criterion, including design principles involving autobiographical reference points, small groupings, and non-facility-specific characteristics. Additionally, it reinforces the sensory stimulation criterion through the accessibility of outdoor spaces.

Moreover, German regulations exhibit features supporting the legibility criterion, such as logical spatial syntax and furniture design, as well as the social interaction criterion, encompassing privacy protection and a sense of belonging. In contrast, South Korea currently

lacks regulations addressing these aspects. A 2019 study examining environmental factors in nursing homes found that residents perceived the physical environment as significantly different from their own homes, lacking a sense of “home-like” feeling [88]. Furthermore, changes in regulations regarding access to outdoor spaces, particularly the rescinding of the mandate for sunlight rooms in 2008, have reduced legal reinforcement for individuals with dementia who rely on sensory stimulation.

4.2. Regulations Regarding the Facility Size of Dementia Nursing Homes

4.2.1. South Korea

The building standards in both South Korea and Germany comprehensively regulate various aspects (from A to I) concerning the sizes of dementia nursing homes (Table 13). South Korean standards specify admission capacity, floor area, and other requirements for both general and dementia units. These include bedroom capacity and net floor area, as well as net floor area of common living room space, with a particular focus on capacity of dementia units (Table 13I).

The maximum capacity of bedrooms in both general and dementia units has been reduced from six individuals, as specified in the revised standards in 1998, to four individuals currently since 2006. The current minimum net floor area for a bedroom in general units remains unchanged at 6.6 m² per person, as it was for specialized nursing homes in 1998. Regarding the bedroom floor area in dementia units, with the introduction of dementia units in 2016, the proposed minimum net floor area for a single bedroom has been 9.9 m², which has remained unchanged to the present day. However, despite concerns from caregivers, the capacity of dementia units increased from 12 individuals in 2016 to 16 in 2019, and it has remained at that level since.

Additionally, the 2019 building standard revision updated the minimum floor area for common living rooms in dementia units to 1.65 m² per person up to now. Before 2019, a mandate was in place requiring that over 25% of the total area be allocated for common living spaces in dementia units, introduced in 2016, while no such regulations existed for common living room areas in general units prior to 2016.

4.2.2. Germany

The German standards cover similar items, excluding those related to dementia units. German bedrooms typically accommodate one to two residents and have a higher minimum net floor area for single bedrooms compared to Korea. Federal law mandates 12 m² per person, while state laws stipulate 12–14 m² per person (Table 13II).

The living room area in Germany varies significantly depending on the state. Each person requires a minimum of 0.75–2.5 m², and the total area must be at least 18–20 m², or alternatively regulated at 3–5 m² per person, as stipulated by certain state laws to enhance a sense of belonging. Therefore, common living rooms in Germany are generally larger than those in Korea. Moreover, the capacity for common living rooms is approximately 12–15 individuals, slightly smaller than the regulation of 16 individuals specified for dementia unit living rooms in Korea.

Additionally, Germany introduces additional criteria such as the ratio of single bedrooms and minimum space width of single bedrooms. These criteria were newly regulated according to state standards established between 2010 and 2014 to enhance personal living spaces in nursing homes for individuals with dementia, providing significantly more privacy.

4.2.3. Summary

The results suggest a close relationship between facility sizes and design criteria such as autonomy, familiarity, sensory stimulation, legibility, and social interaction (Table 14). In both South Korea and Germany, regulations governing the capacity and net floor area of bedrooms, as well as common living rooms, influence design criteria related to autonomy, familiarity, and social interaction for individuals with dementia.

Table 13. Comparison of the size of facilities in dementia nursing homes.

| Facility Sizes | The Entire Facility | | Residential Unit | | | | | | | | | | |
|----------------|---------------------|------|--------------------------------------|-----------------------|--------------------------|---------------------------------------------------------------------------------|--------------------|-----------------------|------------------------------------------|-----------------------|-----------------------|----------------------------------------------------------------------------------------|------------------------------------------|
| | | | General Unit | | | | | Dementia Unit | | | | | |
| | A–B | | C | Resident's Bedroom | | | Common Living Room | | The Unit | Resident's Bedroom | | Com. Living Room | |
| | Capacity (p.) | | Min. Floor Area (m ² /p.) | D | E | F | G | H | I | B | D | F | I |
| | Min. | Max. | | Capacity (p.) Max. | Single-Bedroom Ratio (%) | Min. Net Floor Area (m ²) | Min. Width (m) | Capacity (p.) Max. | Min. Net Floor Area (m ² /p.) | Capacity (p.) Max. | Capacity (p.) Max. | Min. Net Floor Area (m ²) | Min. Net Floor Area (m ² /p.) |
| I. South Korea | | | | | | | | | | | | | |
| | 10 | - | 23.6 | 4 | - | 6.6 per person | - | - | - | 16 | 4 | <div>9.9 (1p.)</div> <div>16.5 (2p.)</div> <div>23.1 (3p.)</div> <div>29.7 (4p.)</div> | 1.65 |
| II. Germany | | | | | | | | | | | | | |
| HeimMindBauV | 6 | - | - | 2 ⁶ | - | <div>12 (1p.)</div> <div>18 (2p.)</div> <div>24 (3p.)</div> <div>30 (4p.)</div> | - | - | (20 + 1) ¹ | | | | |
| BW | - | 100 | - | 1 | 100 | 14 (1p.) ² | 3.2 | 15 | 5 | | | | |
| Bay | 6 | - | - | 1, 2 | - | <div>14 (1p.)²</div> <div>20 (2p.)²</div> | - | - | (20 + 1.5) ^{1,3} | | | | |
| Berl | - | - | - | 1, 2 | 60 | <div>14 (1p.)²</div> <div>22 (2p.)²</div> | - | - | 5 ³ | | | | |
| Ham | - | - | - | 1 | - | 14 (1p.) ² | 3.2 | 12 | (18 + 1) ¹ | | | | |
| Hess | 6 | - | - | 1, 2 | - | <div>14 (1p.)²</div> <div>24 (2p.)²</div> | 3.2 | - | (20 + 2.5) ¹ | | | | |
| MV | - | - | - | 1, 2 | - | <div>12 (1p.)</div> <div>18 (2p.)</div> | - | - | - | | | | |
| NW | - | 36 | 45 | 1, 2 | 80–100 | <div>14 (1p.)²</div> <div>24 (2p.)²</div> | - | - | 5 | | | | |
| RP | - | - | - | 1, 2 | - | <div>14 (1p.)</div> <div>20 (2p.)</div> | - | - | 3 | | | | |
| Sach | 9 | - | - | 1, 2 | - | <div>12 (1p.)²</div> <div>18 (2p.)²</div> | - | - | (20 + 0.75) ^{1,3} | | | | |
| SH | - | - | - | 1, 2 | 75 | <div>14 (1p.)</div> <div>20 (2p.)</div> | - | - | - | | | | |

(A) Min. capacity of the facility; (B) Max. capacity of the facility; (C) Min. floor area for the facility; (D) Bedroom capacity; (E) Single-bedroom ratio; (F) Min. net floor area for bedrooms; (G) Min. space width for a single bedroom; (H) Common living room capacity; (I) Min. net floor area for common living rooms. ¹ Each person requires a minimum of 0.75–2.5 m², but the total area must be at least 18–20 m². ² Non-calculation of private bathroom and its front room. ³ Non-calculation of outdoor spaces as greenhouses, etc. ⁴ A max. of four beds are allowed only with the permission of the competent authority.

Table 14. Design criteria inherent in the facility sizes of dementia nursing homes.

| Design Criteria | I. Autonomy | | | II. Familiarity | | | III. Sensory Stimulation | | | IV. Legibility | | | V. Social Interaction | | |
|-----------------|-------------------------------------------|---------------------|----------------|------------------------|------------------|----------------------------|--------------------------|------------------------------|------------------------|---------------------|----------------|-----------------------|-----------------------|----------------|----------------|
| | I-1 | I-2 | I-3 | II-1 | II-2 | II-3 | III-1 | III-2 | III-3 | IV-1 | IV-2 | IV-3 | V-1 | V-2 | V-3 |
| | Barrier-Free and Compensatory Environment | Safety and Security | Oriental Cues | Biographical Reference | Small Groups | Noninstitutional Character | Encouragement | Avoidance of Overstimulation | Access to the Outdoors | Logical Room Syntax | Furnishing | Fixtures and Fittings | Privacy | Belonging | Communication |
| (A) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| (B) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| (C) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| (D) | ○ ^{1,2} | ○ ^{1,2} | - | - | ○ ^{1,2} | ○ ^{1,2} | - | - | - | - | - | - | ○ ^{1,2} | - | - |
| (E) | ○ ² | ○ ² | - | - | ○ ² | ○ ² | - | - | - | - | ○ ² | - | ○ ² | - | - |
| (F) | ○ ^{1,2} | ○ ^{1,2} | - | - | - | ○ ² | - | - | - | - | - | - | ○ ² | - | - |
| (G) | ○ ² | ○ ² | ○ ² | ○ ² | - | ○ ² | - | - | - | - | ○ ² | - | ○ ² | - | - |
| (H) | ○ ² | ○ ² | - | - | ○ ² | ○ ² | - | ○ ² | - | - | - | - | ○ ² | ○ ² | ○ ² |
| (I) * | ○ ^{1,2} | ○ ^{1,2} | - | - | - | - | - | - | ○ ² | - | - | - | - | ○ ² | ○ ² |

¹ South Korea, ² Germany; (A) Min. capacity of the facility; (B) Max. capacity of the facility; (C) Min. floor area for the facility; (D) Bedroom capacity; (E) Single-bedroom ratio; (F) Min. net floor area for bedrooms; (G) Min. space width for a single bedroom; (H) Common living room capacity; (I) Min. net floor area for common living rooms. * Non-calculation of outdoor spaces: greenhouses, balconies, loggias, terraces, and rooftop gardens. ○: Regulations for facility sizes exist.

Decreasing bedroom capacity and increasing the minimum net floor area of both bedrooms and common living rooms contribute to creating an accessible and compensatory environment, enhancing safety, security, and patient autonomy. This approach also fosters familiarity and supports individual privacy and a sense of belonging in social interactions.

A comparison between South Korea's maximum capacity of four residents and the minimum net floor area of bedrooms, in both general and dementia units, and Germany's standards indicates that German regulations are more conducive to autonomy, familiarity, and social interaction. Additionally, in some states (BW, Berlin, NW, RP), common living room areas are larger than those in Korea, which is advantageous for these characteristics. Notably, in Germany, bathroom and surrounding corridor areas are typically excluded from the bedroom area calculation, further contributing to this advantage.

Germany's specifications for the ratio of single bedrooms and the minimum space width of single bedrooms are particularly noteworthy, optimizing autonomy, familiarity, legibility, and individual privacy protection in social interactions. For instance, Germany's regulations include a single-bedroom ratio of 60–100% (BW, Berlin, NW, SH) and a minimum space width of 3.2 m for single bedrooms (BW, Ham, Hess), aimed at maximizing personal space and facilitating the arrangement and use of personal furniture by individual residents.

Furthermore, Germany's approach to calculating the net floor area of common living rooms, excluding the outdoor space area, enhances the potential for maximizing the net floor area of common living rooms while ensuring accessibility to outdoor spaces for sensory stimulation.

In summary, South Korea's regulations on facility size primarily support autonomy with less emphasis on familiarity, whereas Germany's regulations encompass autonomy, familiarity, sensory stimulation, legibility, and social interaction.

4.3. Necessary Rooms in Dementia Nursing Homes and Detailed Regulations for Necessary Rooms

4.3.1. Configuration of Necessary Rooms within the Residential Unit

1. South Korea

The system for configuring necessary rooms in the residential units of dementia nursing homes, as regulated by the standards of both countries, requires multiple rooms classified into seven spatial areas, as shown in Table 15. Since 2002, the configuration of the necessary rooms differs based on the scale of the facility, categorized either as having a capacity of 30 or more residents, or 10–30 residents.

Table 15. A system for the spatial areas and configuration of necessary rooms in dementia nursing homes.

| A. Individual Spaces | | B. Communal s. | | C. Therapy s. | | D. Hygiene s. | | E. Functional Auxiliary s. | | F. Household Management s. | | G. Staff Duty s. | |
|-----------------------------|------------------|---------------------------------|------------------|------------------------------------|------------------|-----------------------------|------------------|----------------------------|----------------|----------------------------|------------------|------------------|------------------|
| Bedroom | ○ ^{1,2} | Common living room/program room | ○ ^{1,2} | Physical occupational therapy room | ○ ^{1,2} | Ensuite bathroom/toilet | ○ ² | Waste disposal room | ○ ² | Storage room | ○ ² | Nursing station | ○ ^{1,2} |
| Special bedroom | ○ ^{1,2} | Kitchen/cooking room | ○ ^{1,2} | - | - | Common toilet | ○ ^{1,2} | Morgue | ○ ² | Laundry room | ○ ^{1,2} | Staff office | ○ ^{1,2} |
| - | - | Dining room | ○ ^{1,2} | - | - | Common washbasins/bathrooms | ○ ^{1,2} | - | - | Drying room | ○ ^{1,2} | Staff room | ○ ^{1,2} |
| Outdoor space ^{*2} | | | | | | | | | | | | Volunteer room | ○ ¹ |

¹ South Korea, ² Germany. * Garden, terrace, shared balcony, and loggias. ○: Necessary room is identified.

The basic and additional configurations are applied on different capacities accordingly. The basic configurations are commonly applicable for both types and include essential rooms for individual, communal, treatment, hygiene, and staff duty spaces (Table 16I). Related to additional configuration, facilities with a capacity of 30 or more must include additional rooms such as staff offices, caregiver rooms, and volunteer rooms (staff duty spaces) along with shared washbasins/bathrooms (hygiene spaces) and laundry/drying rooms (household management spaces). However, for the latter facilities, two or three of these rooms can be consolidated into one room.

Table 16. Comparison of necessary room configuration in dementia nursing homes.

| Spatial Areas | A. Individual Spaces | | B. Communal s. | | | | C. Therapy s. | E. Functional Auxiliary s. | | D. Hygiene s. | | | F. Household Management s. | | | G. Staff Duty s. | | |
|----------------|----------------------|----------------|----------------|----------------|----------------|----------------|----------------|-------------------------------|---|----------------|----------------|-------------------|----------------------------|----|----------------|------------------|----------------|----------------|
| Necessary Room | B | SB | LR | PR | KD | OS | PT | WD | M | EB | CT | CB | LD | SR | SO | SR | VR | NS |
| I. South Korea | | | | | | | | | | | | | | | | | | |
| >30 | ○ ¹ | ○ ¹ | - | ○ ¹ | ○ ¹ | - | ○ ¹ | - | - | - | ○ ¹ | ○ ² | ○ ² | - | ○ ² | ○ ² | ○ ² | ○ ¹ |
| 10-30 | ○ ¹ | ○ ¹ | - | ○ ¹ | ○ ¹ | - | ○ ¹ | - | - | - | ○ ¹ | ○ ² | | - | | ○ ² | | ○ ¹ |
| Dementia units | ○ | | ○ | - | ○ | - | - | - | - | - | ○ | ○ | | - | | | - | |
| II. Germany | | | | | | | | | | | | | | | | | | |
| HeimMindBauV | ○ | ○ | ○ | - | - | ○ ⁵ | ○ | - | ○ | - | ○ | ○ ^{4(A)} | $\frac{-}{\bigcirc^7}$ | | | | - | |
| BW | ○ | - | ○ | - | ○ | ○ ⁶ | - | $\frac{-}{\bigcirc^7}$ | | ○ ³ | - | ○ ^{4(A)} | $\frac{-}{\bigcirc^7}$ | | | | - | |
| Bay | ○ | ○ | ○ | - | - | - | ○ ⁷ | - | ○ | ○ ³ | - | ○ ^{4(B)} | - | | | | - | |
| Ber | ○ | ○ | ○ | - | - | - | ○ ⁷ | $\frac{\bigcirc}{\bigcirc^7}$ | | ○ ³ | ○ | ○ ^{4(C)} | ○ ⁷ | | | | ○ | |
| Ham | ○ | - | ○ | - | ○ | ○ ⁶ | - | $\frac{-}{\bigcirc^7}$ | | ○ ³ | ○ | ○ ^{4(B)} | $\frac{-}{\bigcirc^7}$ | | | | ○ ⁷ | |

Table 16. Cont.

| Spatial Areas | A. Individual Spaces | | | B. Communal s. | | | C. Therapy s. | E. Functional Auxiliary s. | | D. Hygiene s. | | | F. Household Management s. | | G. Staff Duty s. | | | |
|----------------|----------------------|----|----|----------------|----|----------------|----------------|----------------------------------------------|---|----------------|----|-------------------|-----------------------------------------|----|------------------|----|----------------|----|
| Necessary Room | B | SB | LR | PR | KD | OS | PT | WD | M | EB | CT | CB | LD | SR | SO | SR | VR | NS |
| Hess | ○ | ○ | ○ | - | - | - | ○ ⁷ | $\frac{\text{○} \quad \text{○}}{\text{○}^7}$ | | ○ ³ | - | ○ ⁴ | $\frac{- \quad \text{○}}{\text{○}^7}$ | | | | ○ ⁷ | |
| MV | ○ | ○ | ○ | - | - | ○ ⁶ | ○ | $\frac{\text{○} \quad -}{\text{○}^7}$ | | ○ ³ | ○ | ○ ^{4(D)} | ○ ⁷ | | | | ○ ⁷ | |
| NW | ○ | ○ | ○ | - | ○ | ○ ⁶ | - | - | | ○ ³ | ○ | ○ ^{4(E)} | - | ○ | | | - | |
| RP | ○ | ○ | ○ | - | - | ○ ⁶ | ○ | ○ | - | ○ ³ | ○ | ○ ⁴ | $\frac{- \quad \text{○}}{\text{○}}$ | | | | - | |
| Sachs | ○ | ○ | ○ | - | - | - | - | ○ ⁷ | | ○ ³ | - | - | - | | | | ○ ⁷ | |
| SH | ○ | ○ | ○ | - | ○ | ○ | ○ | $\frac{\text{○} \quad -}{\text{○}^7}$ | | ○ ³ | ○ | ○ ⁴ | $\frac{- \quad \text{○}^7}{\text{○}^7}$ | | | | - | |

B: Bedroom; SB: Special bedroom; LR: Common living room; PR: Program room; KD: Kitchen/dining room; OS: Outdoor space; PT: Physical occupational therapy room; WD: Waste disposal room; M: Morgue; EB: Ensuite bathroom/toilets; CT: Common toilet; CB: Common bathroom; LD: Laundry/drying room; SR: Storage room; SO: Staff office; SR: Staff room; VR: Volunteer room; NS: Nursing station. ¹: Basic configurations; ²: Additional configurations; ³: Inclusion of washbasins, toilets, and shower; ⁴: Common bathroom (^A: One unit per facility; ^B: At least one unit is required for a max. of 40 people; ^C: At least one unit is required for a max. of 30 people; ^D: At least one unit is required for a max. of 32 people; ^E: At least one unit is required for a max. of 20 people); ⁵: Shared balconies, loggias, terraces; ⁶: Garden, shared balconies, terraces; ⁷: Sufficient number and size of necessary facilities. ○: Necessary room is identified.

The current building standards do not require ensuite bathrooms/toilets for either general or dementia units, while installing them is essential for meeting the needs of fully dependent seniors with dementia, ensuring convenient and frequent access.

Moreover, since 2016, dementia units have transitioned to common living rooms instead of program rooms found in general residential units. Notably, regarding outdoor spaces, sunrooms were introduced from 1998 to 2008, and outdoor spaces for dementia units were recommended in revised building standards from 2016 to 2018, with a mandate for dementia-oriented care group homes to have outdoor spaces of at least 15 m². However, both mandates and recommendations for outdoor spaces have since been removed, reducing the possibility for elderly individuals with dementia in nursing homes to access outdoor areas.

2. Germany

The overall scope of room configurations in Germany, which may vary based on federal and state laws, seems very similar to that of Korea, but there are also differences (Table 16II). All German state laws mandate the inclusion of ensuite bathroom/toilets to support the autonomy of elderly individuals with dementia.

Additionally, Germany includes outdoor spaces, waste disposal rooms, morgues, and storage rooms in the list of necessary rooms, which are not covered by South Korea's building standards. Outdoor spaces, in particular, are crucial areas for enhancing sensory stimulation for elderly individuals with dementia, whether in independent or non-independent states, through elements such as sunlight, fresh air, and nature [89].

Furthermore, Germany stipulates the installation of treatment, functional auxiliary, household management, and staff duty spaces in sufficient numbers and sizes.

4.3.2. Detailed Regulations for Necessary Rooms

1. Individual spaces

a. Bedrooms and special bedrooms

In South Korea, detailed regulations focus on various types of bedrooms, including single, multi-person, and couple-shared occupancy types. These

regulations primarily emphasize the autonomy design criterion, focusing on aspects such as bed safety, window size, health and safety equipment, anti-slip flooring, wheelchair access, and daylight. There is only a brief mention of personal storage facilities to enhance the sense of familiarity and privacy (Table 17I). Within the same criterion of autonomy, Germany's building standards pertain to size, accessibility, door control, dimensions, external views, shading, lighting, etc., in bedrooms (Table 17II). Furthermore, they promote familiarity and personal privacy within the criterion of social interaction. This is achieved by arranging diverse furniture, providing adequate personal storage facilities, and ensuring space adaptability, such as allowing the use of a single room as a double room in the case of spousal admission. Both South Korean and German dementia nursing homes require a specific number of special bedrooms to temporarily separate residents in multi-person rooms.

Table 17. Comparison of detailed regulations for individual spaces.

| Regulation | | I. South Korea | II. Germany |
|-----------------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (A-1) Bedroom | | | |
| Autonomy | Barrier-free and compensatory environment | Room type: Single, multi-person, and couple-shared bedrooms. Bed safety: Adjustable height. Window size: 1/7 or more of bedroom floor area. Health equipment: Adequate heating, ventilation, lighting, and moisture-proofing. Safety equipment. Safety handle: Move freely on and off the bed. Anti-slip floor. Wheelchair access: No thresholds. Daylight. | Size: Spacious for wheelchair movement (4). Accessibility: Easy access from corridor or communal spaces (1, 3, 6, 8). Room type: Avoid designs requiring crossing through bedroom (4, 6, 8, 10). Door control: Lockable from inside and unlockable from outside in an emergency (1, 3, 4, 6, 10). Basement bedroom: Prohibited (6). Outside view: Bed should offer outside view (8). Direction: Avoid facing north (8). Shading device: For indoor temperature control (4). Lighting: Bedside reading stand (1, 6). Night lights installed (6). |
| | Safety and security | | |
| Familiarity | Biographical reference | Personal storage: Separate storage by multi-person type. | Furniture: Bed, bedside table, closet, TV, chair, and table arranged for sleep and daily use (4). Spatial variability: Combining single rooms into doubles (5, 6, 2). Personal storage: Ensure at least one location on each floor (6, 9), tailored to resident count (9). Adequate space (1, 2, 10). At least 1 m ² per person near or within private living space, like a closet or shelf, with lockable options (1,5). |
| | Noninstitutional character | | |
| Social interaction | Privacy | | |
| (A-2) Special bedroom | | | |
| | | Size: Less than 5% of total capacity. | Numbers: Single room for temporary use by multi-person room residents (1, 3, 6, 7, 8, 9, 10, 11). At least one single room designated as special for every 30 residents in a double bedroom (8). |

(1) HeimMindBauV (federal law); (2) BW; (3) Bay; (4) Berl; (5) Ham; (6) Hess; (7) MV; (8) NW; (9) RP; (10) Sach; (11) SH.

2. Communal space

a. Common living room

In South Korea, regulations primarily focus on entry control for dementia units and the provision of space usage programs for program rooms in general units, aiming to support the autonomy of seniors with dementia (Table 18I), albeit with relatively limited requirements. On the other hand, German common living rooms have numerous and detailed requirements within the autonomy criterion, such as size, accessibility, space usage program, treatment integration, bed participation, shading, and reading lights (Table 18II). Furthermore, Germany has specifications on privacy and living space to enhance familiarity and a sense of belonging within the social interaction criterion. Additionally, it provides orientational cues and logical room syntax, such as location, thereby supporting autonomy and legibility criteria.

b. Kitchens, dining rooms, and outdoor space

In Korea, kitchen–dining rooms are considered necessary, but kitchens are closed off to patients with dementia, and specific regulations regarding dining rooms are lacking. Between 2016 and 2018, some revisions mandated the installation of a simple kitchenette and dining area within dementia units. However, as of 2019, this requirement is no longer enforced, leaving elderly individuals with dementia in both dementia and general units unable to physically or sensorily engage in kitchen activities.

In contrast, in Germany, kitchen and dining rooms are designated as open spaces accessible to patients with dementia and with wheelchair, and there are regulations regarding their size, numbers, storage, and locations. Consequently, these rooms support residents’ independence and enhance the readability of the dining space, aligning with the autonomy and legibility criteria. Moreover, outdoor spaces in Germany are regulated in terms of size, accessibility, location, protection, and shading to address the autonomy, legibility, and sensory stimulation needs of dementia patients.

Table 18. Comparison of detailed regulations for communal spaces.

| Regulation | | I. South Korea | II. Germany |
|--------------------------|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (B-1) Common living room | | | |
| Autonomy | Barrier-free and compensatory environment | Dementia unit: Entrance door ensures space separation and emergency access. Program room: Cultural and entertainment facilities available for free use. | Size: Consider facility concept, resident count, wheelchair use (11). Accessibility: Good access from bedrooms (3, 4, 6, 10). Single-story layout: (4). Space usage program Functions as living, dining, group activity, socializing, and play areas (4, 7, 9). Treatment integration: Doubles as therapy space (1), ensuring resident privacy (3, 4, 6, 7). Participation from bed: All residents participate (3, 4, 6, 7, 11), even from bed (4, 10). Shading device: (4). Reading lights: (1). |
| | Safety and security | | |
| | Orientational cues | | |
| Legibility | Logical room syntax | - | Location: Centrally located within units (5). |
| Familiarity | Noninstitutional character | - | Privacy: Residence units emphasize individuality (5). |
| Social interaction | Belonging | | Living space: Living area corridor and greenhouse (11). |

Table 18. Cont.

| Regulation | | I. South Korea | II. Germany |
|---------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (B-2) Kitchen/dining room | | | |
| Autonomy | Barrier-free and compensatory environment | Kitchen flooring: Water-resistant. Kitchen cleaning and drainage: Structured for easy cleaning and drainage. Kitchen door lock: Door locks installed for dementia patients. | Size: Adequate for meal prep and resident participation, considering furniture (5). Numbers: At least one kitchen, based on facility needs (1, 2, 8). The location, size, and furniture layout based on resident count (9). Storage: Sufficient for prep and food, with extra per facility needs (4, 8). Wheelchair users: Sink height adjustable for wheelchair access, promoting kitchen participation (5). |
| | Safety and security | | |
| | Orientational cues | | |
| Legibility | Logical room syntax | - | Location: Centrally located within units (5). |
| (B-3) Outdoor space | | | |
| Sensory stimulation | Access to the outdoors | - | Size: Adequate (2, 8, 9). Accessibility: Safe and unrestricted resident access (5), even for wheelchair users (2, 8, 9). Location: Proximity to central communal area (5). Protection: Design to ensure protection (2, 8, 11). Shading device: (5). |

(1) HeimMindBauV (federal law); (2) BW; (3) Bay; (4) Berl; (5) Ham; (6) Hess; (7) MV; (8) NW; (9) RP; (10) Sach; (11) SH.

3. Therapy and hygiene spaces

a. Physical occupational therapy room and ensuite bathroom

In South Korea, there are no regulations related to physical therapy rooms and ensuite bedrooms in South Korea (Table 19I), with the latter lacking specific mandates for necessary rooms. German regulations address the autonomy criterion in the physical occupational therapy room by specifying numbers, sink usage, and shading. Furthermore, they provide various detailed regulations for ensuite bathroom/toilets, including specific guidelines related to autonomy, familiarity, and legibility criteria (Table 19II), such as numbers, accessibility, entrance space, entrance, door control, sanitary equipment, barrier-free, and home-like configuration.

b. Common toilets and bathrooms

South Korean regulations for common toilets and bathrooms include features such as anti-slip floors, wheelchair access, night lights, safety handles, bath tubs, and hot water, aiming to enhance the autonomy of patients with dementia. In contrast, German regulations include more detailed provisions such as numbers, door controls, visitor toilets, and mechanical baths, focusing on autonomy and personal privacy within the criterion of social interaction

Table 19. Comparison of the detailed regulations for therapy and hygiene spaces.

| Regulation | | I. South Korea | II. Germany |
|------------------------------------------|-------------------------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (C-1) Physical occupational therapy room | | | |
| Autonomy | Barrier-free and compensatory environment | - | Numbers: Minimum of one per facility (1, 7, 11), with sufficient size and location determined by resident count and specific needs (3, 4, 6, 7, 9). Sink: At least one sink (4, 6). Shading device: (4). |
| | Safety and security | | |

Table 19. Cont.

| Regulation | | I. South Korea | II. Germany |
|--------------------------------|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (D-1) Ensuite bathroom/toilets | | | |
| Autonomy | Barrier-free and compensatory environment | - | Numbers: Required for 100% single-bedroom ratio (2).Accessibility: Direct connection from bedroom or adjacent room (3, 10, 7). Entrance space: Connecting two bedrooms and one ensuite between a common space and a private space (2). In front of the ensuite (2). Entrance: Avoid two entrances (5, 8). Exceptionally, one ensuite may serve two single rooms (11). Door control: Lockable door, emergency openable (1, 10, 4). Sanitary equipment: Double bedroom requires two sinks (1). At least one of each item: washbasin, shower, and toilet (2–11). Barrier-free: Safety handles in all sanitary facilities (3, 4, 6, 10). Anti-burn devices in washbasins, showers, and bathtubs (3, 6). |
| | Safety and security | | |
| Familiarity | Noninstitutional character | | |
| Legibility | Logical room syntax | | Home-like configuration: Arrangement of bathroom, sanitary equipment, and openings to resemble those found at home (5). |
| (D-2) Common toilet | | | |
| Autonomy | Barrier-free and compensatory environment | Anti-slip floor: Non-slip floors. Wheelchair access. Night lights. | Numbers: At least one per eight individuals on the same floor (1). Adequate number near common bathroom (4). Wheelchair user: Enough for wheelchair users (1). Safety handle: (4). Door control: Emergency door opening (1). Visitor toilet: Sufficient for visitors (4). At least one installation place (5), up to 40 people (8). |
| | Safety and security | | |
| (D-3) Common bathroom | | | |
| Autonomy | Barrier-free and compensatory environment | Anti-slip floor: Non-slip floors. Wheelchair access. Safety handle. Bathtub: Shallow with at least one grip rail and vertical handle lights Hot water: Temperature under 40 degrees Celsius with automatic thermostat use. Night lights. | Numbers: One facility per 20 residents (8), 30 or 32 people (4, 7), and 40 residents (3, 5, 7). One bathtub or shower per 20 people (1) and consider resident count (9). Wheelchair user: Available (6), sufficient quantities (1). Door control: Emergency door opening (1). Sanitary equipment: At least one tub, shower, and sink. Bathtub: Safe entry and exit (1, 4). Safety handle: In the bathtub, shower, and toilet (1, 4, 6). Mechanical bath: For medical use (6), tailored to individual needs (9). |
| | Safety and security | | |
| Social interaction | Privacy | | Privacy: Modesty protection (1,6) with curtains around tub and shower (4) |

(1) HeimMindBauV (federal law); (2) BW; (3) Bay; (4) Berl; (5) Ham; (6) Hess; (7) MV; (8) NW; (9) RP; (10) Sach; (11) SH.

4. Functional auxiliary, household management, and staff duty spaces

Spaces that typically do not permit the entry and accessibility of patients with dementia, such as functional auxiliary, household management, and staff duty spaces, are crucial from the perspective of effective caregiving. These spaces generally do not reflect their correlation with design criteria for patients with dementia. In South Korea, detailed regulations exist only regarding the installation of medical supplies and equipment in medical and nursing staff rooms (Table 20I). Germany has slightly more detailed regulations for them (Table 20II), which describe the number, location, morgue, and storage.

Table 20. Comparison of detailed regulations for functional auxiliary, household management, and staff duty spaces.

| Regulation | I. South Korea | II. Germany |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (F) Functional auxiliary spaces | | |
| Waste disposal room | | Numbers: Installed on each floor (6). |
| Morgue | | Morgue: Required if quick body transport is not ensured in double-bedroom facilities (1, 3, 6). |
| (G) Household management spaces | | |
| Storage room | | Numbers: At least one in-house management space (2). If unable to outsource external household services, provide adequate facilities internally (1, 4, 6, 7). Storage: Accommodate machinery, appliances, in-house items, wheelchairs, beds, and medical devices (9, 4). Include a warehouse for household goods, laundry, and medicines (4, 5). |
| Laundry room, drying room | | |
| (H) Staff duty spaces | | |
| Nursing station | Medical supplies and devices: Installation of necessary medical equipment and pharmaceutical hygiene materials. | Numbers: As many locations and sizes as necessary (2, 5, 6, 7, 10). Location: Essential for resident care (5, 7), positioned in a common area within the residential unit (5). |
| Staff offices | | |
| Staff changing room, staff break room | | Location: Place outside the residential unit (5). |
| Caregiver's room | | |
| Volunteer room | | |

(1) HeimMindBauV (federal law); (2) BW; (3) Bay; (4) Berl; (5) Ham; (6) Hess; (7) MV; (9) RP; (10) Sach.

4.3.3. Summary

The analysis of the necessary rooms configurations reveals that in South Korea, the configuration is differentiated based on facility size, with basic and additional configurations applied depending on whether the facility accommodates 10–29 residents or 30 or more residents. The ensuite bathroom/toilets in bedrooms are not mandatory for both general and dementia units, which interferes with the autonomy and privacy of elderly individuals with dementia. There are no recommendations or mandatory regulations for outdoor spaces, which were maintained in the form of a sunroom in 1998 and then removed in 2008, weakening the sensory stimulation for residents. However, Germany has regulations for ensuite bathroom/toilets, outdoor spaces, waste disposal rooms, morgues, and storage rooms. In terms of the detailed regulations for each space, both South Korea and Germany emphasize specific design principles aimed at enhancing the autonomy of dementia patients. While there are some detailed regulations related to autonomy in individual, communal, and hygiene spaces in Korea, regulations for treatment and other areas of spaces are few or largely excluded. Germany primarily focuses on autonomy in the majority of its regulations and additionally includes provisions that enhance familiarity, sensory stimulation, legibility, and social interaction. The total characteristics observed in the detailed regulations for necessary rooms are summarized in Table 21.

Table 21. Design criteria inherent in the detailed regulations for necessary rooms of dementia nursing homes.

| Design Criteria | I. Autonomy | | | II. Familiarity | | | III. Sensory Stimulation | | | IV. Legibility | | | V. Social Interaction | | |
|-------------------------------------|-------------------------------------------|---------------------|----------------|------------------------|--------------|----------------------------|--------------------------|------------------------------|------------------------|---------------------|------------|-----------------------|-----------------------|----------------|---------------|
| | I-1 | I-2 | I-3 | II-1 | II-2 | II-3 | III-1 | III-2 | III-3 | IV-1 | IV-2 | IV-3 | V-1 | V-2 | V-3 |
| | Barrier-Free and Compensatory Environment | Safety and Security | Oriental Cues | Biographical Reference | Small Groups | Noninstitutional Character | Encouragement | Avoidance of Overstimulation | Access to the Outdoors | Logical Room Syntax | Furnishing | Fixtures and Fittings | Privacy | Belonging | Communication |
| (A) Individual spaces | | | | | | | | | | | | | | | |
| Bedrooms | ○ ^{1,2} | ○ ^{1,2} | - | ○ ² | - | ○ ² | - | - | - | - | - | - | ○ ² | - | - |
| Special bedrooms | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| (B) Communal s. | | | | | | | | | | | | | | | |
| Common living rooms | ○ ^{1,2} | ○ ^{1,2} | ○ ² | ○ ² | - | ○ ² | - | - | - | ○ ² | - | - | - | ○ ² | - |
| Kitchens/dining rooms | ○ ^{1,2} | ○ ^{1,2} | ○ ² | - | - | - | - | - | - | ○ ² | - | - | - | - | - |
| Outdoor spaces | ○ ² | ○ ² | ○ ² | - | - | - | - | - | ○ ² | - | - | - | - | - | - |
| (C) Therapy s. | | | | | | | | | | | | | | | |
| Physical occupational therapy rooms | ○ ² | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| (D) Hygiene s. | | | | | | | | | | | | | | | |
| Ensuite bathroom/toilets | ○ ^{1,2} | ○ ^{1,2} | - | - | - | ○ ² | - | - | - | ○ ² | - | - | - | - | - |
| Common toilet | ○ ^{1,2} | ○ ^{1,2} | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Common bathrooms | ○ ^{1,2} | ○ ^{1,2} | - | - | - | - | - | - | - | - | - | - | ○ ² | - | - |

¹ South Korea, ² Germany. ○: Detailed regulations for necessary rooms exist.

5. Conclusions

This study began by addressing the issue of rapid aging in South Korea that is turning the country into a super-aged society with a growing population of individuals with dementia. The focus was on the architectural and regulatory importance of dementia nursing homes as dementia-friendly built spaces by comparing the building standards for dementia nursing homes in South Korea and Germany. This study is a foundational research and aimed to analyze differences through a comparison of building standards for dementia nursing homes in South Korea and Germany, and proposing improvement points for South Korea by examining the current laws of both countries: the Welfare of Senior Citizens Act and its enforcement regulations in South Korea, as well as the Federal Nursing Home Act (HeimG), the Regulation on Minimum Standards for Nursing Homes (HeimMindBauV), and its state laws in Germany. The results of this study are summarized as follows.

First, Germany introduced the Federal Nursing Home Act in 1974 and its subsidiary legislation, the Regulation on Minimum Standards for Nursing Homes in 1978, along with the Long-Term Care Insurance System in 1995. Similarly, South Korea enacted the Welfare of Senior Citizens Act in 1981, along with its secondary legislation, the Enforcement Regulations of the Welfare of Senior Citizens Act in 1982, and additionally established the Long-Term Care Insurance System in 2008.

Second, the scope of application of the superior laws differed between South Korea and Germany. In South Korea, laws such as the Welfare of Senior Citizens Act vary in their application based on facility size, distinguishing between nursing homes (with 10 or more residents) and care group homes (with between 5 and 9 residents), both targeting elderly individuals and integrated into elderly medical welfare facilities. In Germany, the Federal Nursing Home Act and state laws apply not only to nursing homes but also to various forms of ambulatory shared care homes and assisted living facilities, catering not only to the elderly but also to adults in need of care and individuals with disabilities. Furthermore, inferior laws that specify building standards for dementia nursing homes differ in their structure. In South Korea, these standards are outlined in the Enforcement Regulations of the Welfare of Senior Citizens Act, a subordinate regulation of the Welfare of Senior Citizens Act. In Germany, these regulations are consolidated at the federal level in the Regulation on Minimum Standards for Nursing Homes, along with 10 corresponding regulations at the state level, following the federalism reform in 2006.

Third, the significance of planning dementia nursing homes arises from the need to incorporate design criteria related to autonomy, familiarity, sensory stimulation, legibility, and social interaction within dementia-friendly built spaces. Regarding the basic requirements for dementia nursing homes, current building standards in South Korea primarily focus on supporting autonomy (barrier-free and compensatory environments, safety, and security) and social interaction (communication with the local community), which have remained unchanged since 1998. However, items related to oriental cues, alarms, communication devices under the autonomy criterion, and design principles within other criteria aiding elderly individuals with dementia have not been discussed.

In contrast, Germany's state laws, since 2010, additionally emphasize their barrier-free standards and oriental cues, focusing on autonomy, as well as familiarity (biographical references, small groups, noninstitutional characteristics), sensory stimulation (outdoor accessibility), legibility (logical room syntax, furniture), and social interaction (privacy, sense of belonging) (Table 22). To enhance South Korean standards, integrating the existing Barrier Free (BF) Living Environment Certificate into building standards is recommended. This voluntary participation system was introduced in 2007 and became mandatory for children, senior welfare, and disability welfare facilities in 2015. Furthermore, detailed regulations on autonomy criterion and new regulations addressing Korean residents' perception of a lack of "home-like" features in nursing homes were identified as areas for South Korea's further development for discussion, covering familiarity, sensory stimulation, legibility, and social interaction (Table 23).

Table 22. Comprehensive comparative analysis of building standards for dementia nursing homes in South Korea and Germany.

| Design Criteria | I. Autonomy | | | II. Familiarity | | | III. Sensory Stimulation | | | IV. Legibility | | | V. Social Interaction | | |
|------------------------|-------------------------------------------|---------------------|---------------|------------------------|--------------|----------------------------|--------------------------|------------------------------|------------------------|---------------------|------------|-----------------------|-----------------------|-----------|----------------|
| | Barrier-Free and Compensatory Environment | Safety and Security | Oriental Cues | Biographical Reference | Small Groups | Noninstitutional Character | Encouragement | Avoidance of Overstimulation | Access to the Outdoors | Logical Room Syntax | Furnishing | Fixtures and Fittings | Privacy | Belonging | Communication |
| (1) Basic requirements | | | | | | | | | | | | | | | |
| South Korea | ○ | ○ | | | | | | | | | | | | | ○ ¹ |
| Germany | ● | ● | ○ | ○ | ○ | ○ | | | ○ | ○ | ○ | | ○ | | |
| (2) Facility sizes | | | | | | | | | | | | | | | |
| South Korea | ○ | ○ | | | ○ | ○ | | | | | | | ○ | | |
| Germany | ● | ● | ○ | ○ | ● | ● | | ○ | ○ | | ○ | | ○ | ○ | ○ |

Table 22. Cont.

| Design Criteria | I. Autonomy | | | II. Familiarity | | | III. Sensory Stimulation | | | IV. Legibility | | | V. Social Interaction | | |
|---------------------------------------------|-------------------------------------------|---------------------|---------------|------------------------|--------------|----------------------------|--------------------------|------------------------------|------------------------|---------------------|------------|-----------------------|-----------------------|-----------|---------------|
| | Barrier-Free and Compensatory Environment | Safety and Security | Oriental Cues | Biographical Reference | Small Groups | Noninstitutional Character | Encouragement | Avoidance of Overstimulation | Access to the Outdoors | Logical Room Syntax | Furnishing | Fixtures and Fittings | Privacy | Belonging | Communication |
| (3) Necessary rooms | | | | | | | | | | | | | | | |
| South Korea | | | | | | | | | | | | | ○ | | |
| Germany | | | | | | | | | ○ ² | | | | ○ ³ | | |
| (4) Detailed regulations of necessary rooms | | | | | | | | | | | | | | | |
| South Korea | ○ | ○ | | | | | | | | | | | | | |
| Germany | ● | ● | ○ | ○ | | ○ | | | ○ | ○ | | | ○ | ○ | |

○ Regulations are in place, ● More stringent regulations; ¹ Community communication, ² Outdoor spaces, ³ Ensuite bathroom/toilets.

Table 23. Implications for building standards for dementia nursing homes in South Korea.









| | Design Criteria | | | | | Implications | |
|------------------------|-----------------|----|-----|----|---|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | I | II | III | IV | V | | |
| (1) Basic requirements | ○ | | | | | - | Specification of Korean Barrier Free (BF) Living Environment Certificate. |
| | ○ | | | | | - | Description of natural lights (an external view from bed, sun control devices). |
| | | | | | | |   |
| | ○ | | | | | - | Description of artificial lighting (reading lights, night lights for nighttime care). |
| | ○ | | | | | - | Description related to orientational cues. |
| | | | | | | |   |
| | ○ | | | | | - | Description of emergency alarm on beds and in various spaces, as well as communication devices such as radios, TVs, phones, internet access for residents. |
| | ○ | | | ○ | | - | Description of personal privacy, as well as aspects related to home environment and past personal furniture and items in bedrooms. |

Table 23. Cont.

| | Design Criteria | | | | | Implications |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|----|---|-------------------------------------------------------------------------------------------------------------------------|
| | I | II | III | IV | V | |
| (1) Basic requirements |   | | | | | [94] [95] |
| |   | | | | | [96] [94] |
| | ○ | | ○ | | | - Description of secure outdoor spaces (safety, access, solar control devices). |
| |   | | | | | [96] [97] |
| | | | ○ | | | - Description of logical room syntax (spatial arrangement, orientation elements). |
| (2) Facility sizes |   | | | | | [98] [99] |
| | ○ | ○ | | ○ | ○ | - Reducing the occupancy in bedrooms (currently a max. of four individuals). |
| | ○ | ○ | | | ○ | - Increasing the min. net floor area for bedrooms. |
| | ○ | ○ | ○ | | ○ | - Introducing the occupancy for common living rooms in general units (currently 16 persons in dementia units) |
| | ○ | ○ | ○ | | ○ | - Expanding the net area for common living rooms (currently min. 1.65 m ² per person within dementia units). |
| | ○ | ○ | | | ○ | - Introducing the ratio of single bedrooms. |
| | ○ | ○ | | ○ | ○ | - Introducing the min. room width for single bedrooms. |

Table 23. Cont.

| | Design Criteria | | | | | Implications |
|---------------------------------------------|-----------------|----|-----|----|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | I | II | III | IV | V | |
| | | | ○ | | | - Organizing outdoor spaces for residents. |
| | | | | | |  [96]  [100] |
| (3) Necessary rooms | ○ | ○ | | | ○ | - Installation of an ensuite bathroom. |
| | | | | | |  [91]  [94] |
| | | | | | | - Inclusion of functional auxiliary spaces such as a waste disposal room and a morgue. |
| (4) Detailed regulations of necessary rooms | ○ | ○ | | | ○ | Bedrooms |
| | | | | | | - Reviews on size, accessibility, door control, outside view, shading device, furniture, spatial variability, etc. |
| | ○ | ○ | | ○ | ○ | Common living room |
| | | | | | | - Reviews on size, accessibility, participation from bed, shading device, reading lights, location, privacy, living spaces, etc. |
| | ○ | | | ○ | | Kitchen and dining room |
| | | | | | | - Reviews on size, wheelchairs users, location, etc. |
| | ○ | | ○ | ○ | | Outdoor spaces |
| | | | | | | - Reviews on size, accessibility, location, protection, shading device, etc. |
| | ○ | | | | | Physical occupational therapy room |
| | | | | | | - Reviews on numbers, sink, shading device, etc. |
| | ○ | ○ | | ○ | | Ensuite bathrooms |
| | | | | | | - Reviews on numbers, accessibility, entrance space, entrance, door control, sanitary equipment, home-like configuration, etc. |
| | ○ | | | | | Common toilets |
| | | | | | | - Reviews on numbers, wheelchair users, etc. |
| | ○ | | | ○ | | Common bathrooms |
| | | | | | | - Reviews on numbers, wheelchair user, door control, mechanical bath, etc. |

○: Improvement points are identified.

Fourth, parameters in both countries regarding facility size, such as capacity and minimum net floor area for bedrooms and common living rooms, highlight Germany's greater emphasis on design criteria related to autonomy, familiarity (biographical references, small groups), and social interaction (privacy, sense of belonging) (Table 22(2)). For instance, Germany's standards even include specific ratios and minimum widths for single bedrooms, reflecting this emphasis. Research in Korea has shown that elderly residents in nursing homes who use single rooms exhibit higher levels of self-respect, suggesting the importance of privacy and personal space [101]. However, meeting this demand remains challenging, especially with a maximum of four people per room currently. Previous studies in Korea have recommended adhering to single-room standards to achieve a more adequate bedroom

area, which can support individual living space and prolonged bed rest or extended stays in the bedroom after admission [102–104]. Moreover, there has been a persistent demand in Korea to expand the area of common living rooms, as indicated by earlier research [105–108]. This demand aims to diversify living spaces outside of bedrooms, provide optional extensions of spaces, and integrate functions of open integrated living rooms combining living, dining, and program rooms for both personal and social interactions. Therefore, adjustments such as reducing the capacity per bedroom and increasing the minimum net floor area of bedrooms and common living rooms are necessary. South Korea could benefit from ongoing discussions on parameters such as capacity per bedroom and minimum net floor area, and consider introducing additional parameters like the ratio and minimum width of single bedrooms (Table 23(2)).

Fifth, in South Korea, ensuite bathrooms/toilets, common outdoor spaces, and functional auxiliary spaces such as waste disposal rooms, morgues, and storage rooms are not explicitly specified as required rooms (Table 22(3)). In contrast, Germany has regulations for these rooms to enhance the health and well-being of dementia patients and the efficiency of caregivers. Given the importance of ensuite bathrooms/toilets for autonomy and privacy [109], as well as outdoor spaces for sensory stimulation [89,110], South Korea should consider incorporating these features into dementia nursing homes (Table 23(3)). Discussions regarding these enhancements should address how ensuite bathrooms and outdoor spaces contribute to autonomy, individual privacy, social interactions, and sensory stimulation for elderly individuals with dementia. Thorough review of outdoor spaces, as well as kitchenette and dining areas in dementia units, which were temporarily introduced from 2016 to 2018, should be part of the discussion.

Sixth, both South Korea and Germany prioritize specific provisions related to the design criterion of autonomy for seniors with dementia in their detailed regulations for necessary rooms (Table 22(4)). In Korea, these regulations gradually decrease across personal, communal, and hygiene spaces, with few or no regulations for treatment, functional auxiliary, household management, and staff duty spaces. In contrast, Germany's building standards for these rooms go beyond autonomy to include provisions enhancing familiarity, sensory stimulation, legibility, and social interaction. Therefore, when revising South Korea's detailed regulations for necessary rooms, it is essential to conduct research and consider discussing and potentially incorporating these additional provisions in the future (Table 23(4)).

In summary, while South Korea's building standards for nursing homes catering to seniors with dementia primarily emphasize autonomy, particularly focusing on features such as barrier-free and compensatory environments, safety and security measures, Germany's building standards delve more specifically into characteristics related to alarms, communication devices, and support for orientational cues within the same criteria. Beyond autonomy, Germany's standards encompass numerous design criteria including familiarity, sensory stimulation, legibility, and social interaction. Consequently, for future enhancements to South Korea's building standards, conducting analyses that specifically focus on spatial usage within Korean nursing homes should be the next step in this foundational research.

6. Discussion

Given the limited research on spatial utilization in preceding studies, further exploration in this area is warranted. After conducting the analyses, it is crucial to engage in discussions and incorporate the findings to accurately address the current needs of residents in Korean dementia nursing homes while avoiding overestimating these requirements. Moreover, during the analysis of spatial usage and subsequent discussions and implementations, it is imperative to thoroughly review regulations pertaining to autonomy, familiarity, sensory stimulation, legibility, and social interaction.

In both Korea and Germany, autonomy emerged as the foremost design criterion in building standards, while regulations concerning familiarity, sensory stimulation, legibility,

and social interaction were relatively scarce. Hence, both countries must undertake a comprehensive review and supplementation of detailed items within these design criteria for future development.

This analysis of the disparities in building standards between Korea and Germany provides valuable insights for enhancing South Korea's building standards for dementia nursing homes. By considering the potential impact of adopting German standards, this study lays the groundwork for establishing more dementia-friendly environments in Korean nursing homes. Furthermore, it serves as a valuable resource for future reviews of building standards in South Korea, aiming to provide pertinent data to relevant institutions and policymakers to enhance the built environments of dementia care facilities in the country.

While the study's strength lies in its focus on dementia-friendly built space design and cross-national comparison with Germany's building standards, there are some limitations. These include the insufficient consideration of spatial utilization characteristics in current Korean nursing homes, neglect of cultural–historical backgrounds, regional focus, and limited international perspectives due to data availability.

Therefore, conducting more comprehensive analyses on spatial usage within cultural and historical contexts, expanding the geographical scope, and increasing sample sizes in future studies would enhance the validity and generalizability of findings.

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