FORGET ABOUT *DEMENTIA*

A research into the prevention of ***dementia***
through architectural interventions
in our built environment

Research plan

Amber Gorter

RESEARCH PLAN

Amber Gorter
4673212

Date:
November 10th, 2023

Delft Universtity of Technology:
Factulty of Architecture and
the Built Environment

Department of Architecture
Chair of Architecture and Dwelling

Course:
Graduation studio
AR3AD110: Designing for health and care
Designing for Care in an Inclusive environment

Tutors:

Birgit Jürgenhake	Architecture tutor
Kobe Macco	Research tutor (primary)
Leo Oorschot	Research tutor (secondary)

'There comes a point in time where we need to stop just pulling people out of the river, we need to go upstream and find out why they're falling in'.

- Bishop Desmond Tutu

CONTENT

FASCINATION

When my grandfather turned 87 years old, we gave him a new watch. He lost his old watch which made him very sad as he had owned that watch for a long time. He unwrapped the new watch and started to get tears in his eyes out of happiness of receiving a new one from us.

A week later I visited my grandfather again together with my father. Soon we noticed he was not wearing his new watch so we asked him where it was. My grandfather cluelessly shook his head and told us that he had lost his watch and could not find it anymore and that he was very sad about it. We reminded him about the new watch we gave him last week but he had no idea which watch we were talking about. He forgot we had given him a new watch for his birthday last week. We found it hidden in one of his bed side drawers where he had probably put it right after we left last week because he didn't recognize it. We gave it to him again and he responded with the same amount of happiness as the first time he had received his gift a week ago on his birthday. A week later this story repeated itself again.

Something that I have always admired about my grandfather is his positivity and gratefulness about the littlest things in life. Even now, when I think of him, years after he passed away, I remind myself to take example of him and his positive view on life. As I pass by the nursing home he resided in during his time battling dementia in the last years of his life, I can't help but wonder about how the last years of his life would have looked without dementia. Is there a way to prevent people from developing dementia so that elderly, like my grandfather, can enjoy the last years of their lives to the fullest and stay 'their own person and identity'?

INTRODUCTION

Growing older is something that is inevitable for all of us. However sadly, many of us assume growing older is associated with becoming less vital and getting sick. Developing a disease such as dementia has become almost indispensable in our society; as if it is our unavoidable fate that we all expect will happen once we become older. This is because, like I have experienced with my own grandfather, we have all seen our (grand)parents, partners and friends undergo that fate of suffering from illnesses that hinders them from enjoying the last years of their lives. Instead of awaiting this future ourselves, relatively few of us are taking measures that could potentially help us prevent that outcome. Dr Attia, who is a prominent longevity expert, addresses this topic in his book 'outlive; the science and art of longevity' by stating that there is a lack of societal resilience against getting sick when we are older even though our own future is more malleable than we think[1].

BACKGROUND

Our world population has grown enormously from 2.9 billion in 1950 to 7.8 billion in 2020. The same applies to our global life expectancy, which has increased thirty years since the mid-twentieth century: It has risen from 47 to 73 years in those seven decades. Our life expectancy is considered to be the benchmark of the population's health, however, our healthspan (time free of diseases) has not followed these increases. This is largely due to the pandemic of chronic diseases that are afflicting the growing older population and is causing a deterioration in the quality of life of their lives[2].

Among these chronic diseases, dementia is the fastest growing cause of death in the Netherlands according to the Centraal Bureau of Statistiek[3]. Dementia is used as an umbrella term to describe a range of neurological diseases that are affecting our brain and cognitive thinking. The most common cause of dementia is Alzheimer's disease[4]. Estimating that 1 in 5 people in the Netherlands develops dementia, currently more than 280.000 people live with this disease. They expect that these numbers will increase to over half a million people by 2040[5]. Moreover, they estimate these number to rise to about 620.000 in 2050, which is partly due to our older growing population[6]. Globally this disease is affecting around 15% of our worldwide population [7].

Besides these increases in the amount of people with dementia, it is the age-related disease with the highest healthcare costs. Due to the rapid increase of the amount of people diagnosed with dementia, these costs will even rise more and be a burden on the population and the societies' taxes. In 2020 the costs for dementia care were 10.3 billion (10,6% of the total healthcare costs) which was a rise of almost 2 billion compared to the 8.6 billion in 2017[8]. These rises are not only caused by the increased number of people with dementia but also because the care in nursing homes is becoming more expensive[9] .

This is resulting in a huge challenge how to keep neurological care accessible for everyone both in medical care as well as in meeting the demand for special care homes in our living environment. This puts an enormous pressure on our healthcare system[10]. The World Health Organization and the United Kingdom's National Health Service are therefore alarmingly stating that *'the availability of resources for neurological services are insufficient in most countries of the world compared with the global need for neurological care'* and that *'neurological services are not sustainable in their current form and redesign is needed'*[11] .

1. Attia & Gifford, 2023, p. 37.
2. Garmany et al., 2021.
3. Factsheet Cijfers En Feiten Over Dementie | Alzheimer Nederland, n.d.
4. What Is Dementia? | Alzheimers.gov, n.d.
5. 1 Op De 5 Mensen Krijgt Dementie | Alzheimer Nederland, n.d.
6. Factsheet Dementie | Vektis, 2022.
7. Feigin et al., 2020.
8. Ranglijsten | Aandoeningen Op Basis Van Zorguitgaven | Volksgezondheid En Zorg, n.d.
9. Factsheet Dementie | Vektis, 2022.
10. "Werkdruk En Arbeidstevredenheid in De Zorg | CBS," 2022.
11. Dorsey et al., 2018.

PROBLEM STATEMENT

The approach of our modern healthcare system has failed to make much progress against age-related chronic diseases as the sole focus is on treatment rather than prevention[12]. Especially for dementia, mainstream medicine has not worked properly as it is the only folk disease for which no solution has been found yet[13]. The Dutch government's healthcare advisor Zorginstituut Nederland is therefore also advocating for a *'rigorous change'* of approach from solely treatment to also preventive measures in order to find ways to prevent these diseases as they warn that the current healthcare system is risking of becoming too overburdened and unaffordable unless it will undergo some changes[14].

In recent years, more studies have been conducted into the search for preventive measures by creating a healthy environment for people that could contribute to the prevention of diseases and change our common believe that we are unable to prevent ourselves from getting sick[15]. These are focused more on the larger scale in our urban context and living environment as The National Institute for Public Health and the Environment for example published a report in August 2023 that examined the correlation between a healthy living environment and chronic diseases (cancer, obesity and dementia). They consider this a first step into creating a more intensive approach to preventing these diseases on a national level. They state that the influence of the living environment on health, both directly as well as indirectly through other determinants of health is offering opportunities for the prevention of cancer, dementia and obesity: '

a safe, healthy and green living environment not only protects against health-threatening factors in the environment (such as radiation, air, pollution, tobacco smoke, chemicals and viruses and bacteria), but also promotes healthy behavior and thus reduces the risk of cancer, dementia and obesity' [16]

However, these are generally focusing on the living environment on the larger scale but leave out the effects of the smaller scale (neighborhood and building scale) of our built environment as a prevention tool.

RESEARCH QUESTION

By changing our approach from treatment to prevention in both the medical and built environment, opportunities arise to create fitting design guidelines that can be applied in the built environment that can contribute to the changing health approach. Therefore, the main question of this research is:

How can architecture and the built environment be an instrument in developing design guidelines that contribute to the prevention of dementia?

12. Attia & Gifford, 2023, pp.26-27.
13. 1 Op De 5 Mensen Krijgt Dementie | Alzheimer Nederland, n.d.
14. Pascoe, 2022.
15. Attia & Gifford, 2023, pp.28-29.
16. Relatie Tussen Gezonde Leefomgeving En Kanker, Overgewicht En Dementie | RIVM, n.d.

SUB-QUESTIONS

To allow this main question to be fully investigated, a set of sub-questions have been defined to structuralize the research in order to answer the main question:

1. What is dementia, and how do architectural interventions within the existing built environment currently respond/adapt in order to support the daily lives of dementia sufferers?

2. What characteristics of dementia are preventable through architectural interventions within the built environment?

3. What are different principles of a healthy living environment and how can these contribute to the goal of preventing dementia (while prolonging healthy living)?

RESEARCH AIM

By researching how architecture and the built environment can be utilized to develop healthy building guidelines that contribute to the prevention of dementia, this research aims to use architectural and design interventions as a supporting instrument to prevent dementia in order to extend people's healthspan as well as prolonging the quality of their lives. This could be achieved by closing the existing gap between our lifespan (total years lived) and our healthspan, which is the period in our lives we live free of diseases[17].

Our global life expectancy, that is considered to be the benchmark of our population's health, has reached 72.8 years in 2019 which is an increase of nine years since 1990. Moreover, this is estimated to increase to an average longevity of 77.2 years globally in 2050[18]. Our Healthspan however has not reached that age yet as recent studies, conducted by the World Health Organization in 2020, estimated a nine-year gap between our healthspan and lifespan by using health-adjusted life expectancy that considers life expectancy (year lived with disability) and premature death from diseases[19]. Thus, in order to close this gap, we need to prevent diseases like dementia.

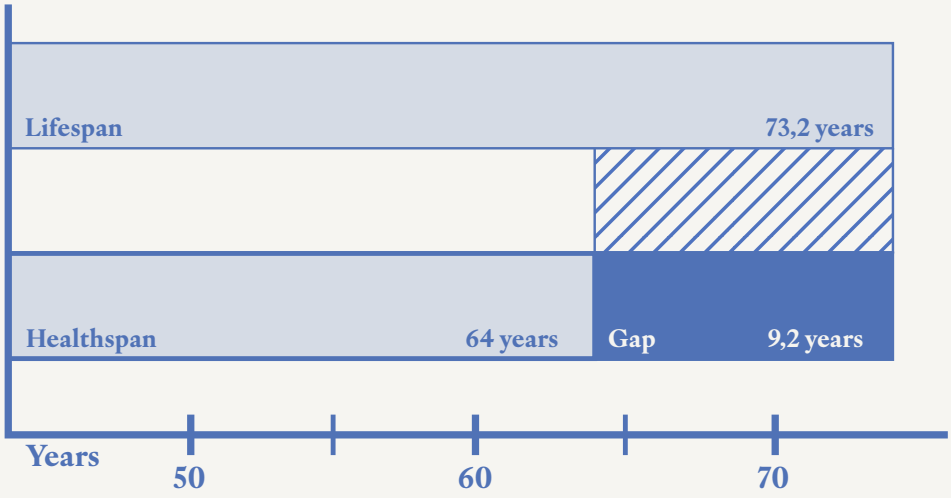


Figure 1: Healthspan vs. lifespan gap, own illustration (2023) (Source: Garmany et al., 2021, fig. 2).

17. Garmany et al., 2021, p. 1.
18. World Population Prospects 2022, 2022.
19. Garmany et al., 2021.

RESEARCH SCOPE

This research will solely focus on the prevention of dementia, as this is the fastest growing cause of death in The Netherlands. The World Health Organization currently estimates the number of people living with dementia is over 50 million and believe this number will almost triple by 2050 [20]. It is therefore important to research preventive measures for this disease in order to reduce the pressure on our healthcare system. Dementia is known to be caused and influenced by different aspects both genetical as well as environmental factors[21]. This research will be conducted from an architectural perspective instead of a medical perspective by solely aiming to develop building guidelines that can contribute to the prevention of dementia.

RESEARCH RELEVANCE

There are four factors that are clarifying the relevance of this research:

Social aspect

By making people aware that their healthspan is more malleable than they think and educating them on strategies to implement in their daily lives, they can contribute themselves to prolonging their healthspan.

Health aspect

By implementing more preventive measures, less people are dependent on special treatment which reduces the pressure on our healthcare systems.

Care aspect

By preventing or delaying elderly from needing special care, they are able to live longer independently. This would reduce the demand for special care and nursing homes so people can grow older at home and age in place.

Economical aspect

Currently, insurances now only pay for care after diagnosis and not for preventive care methods[22].By investing more money into preventive measures rather than solely on the insurance of treatments and prescription medicine of diagnosed patients, healthcare costs in general could potentially be reduced and become more attractive economically.

20. World Health Organization, 2021.
21. Can Dementia Be Prevented? | NHS, 2023.
22. Attia & Gifford, 2023, p.34.

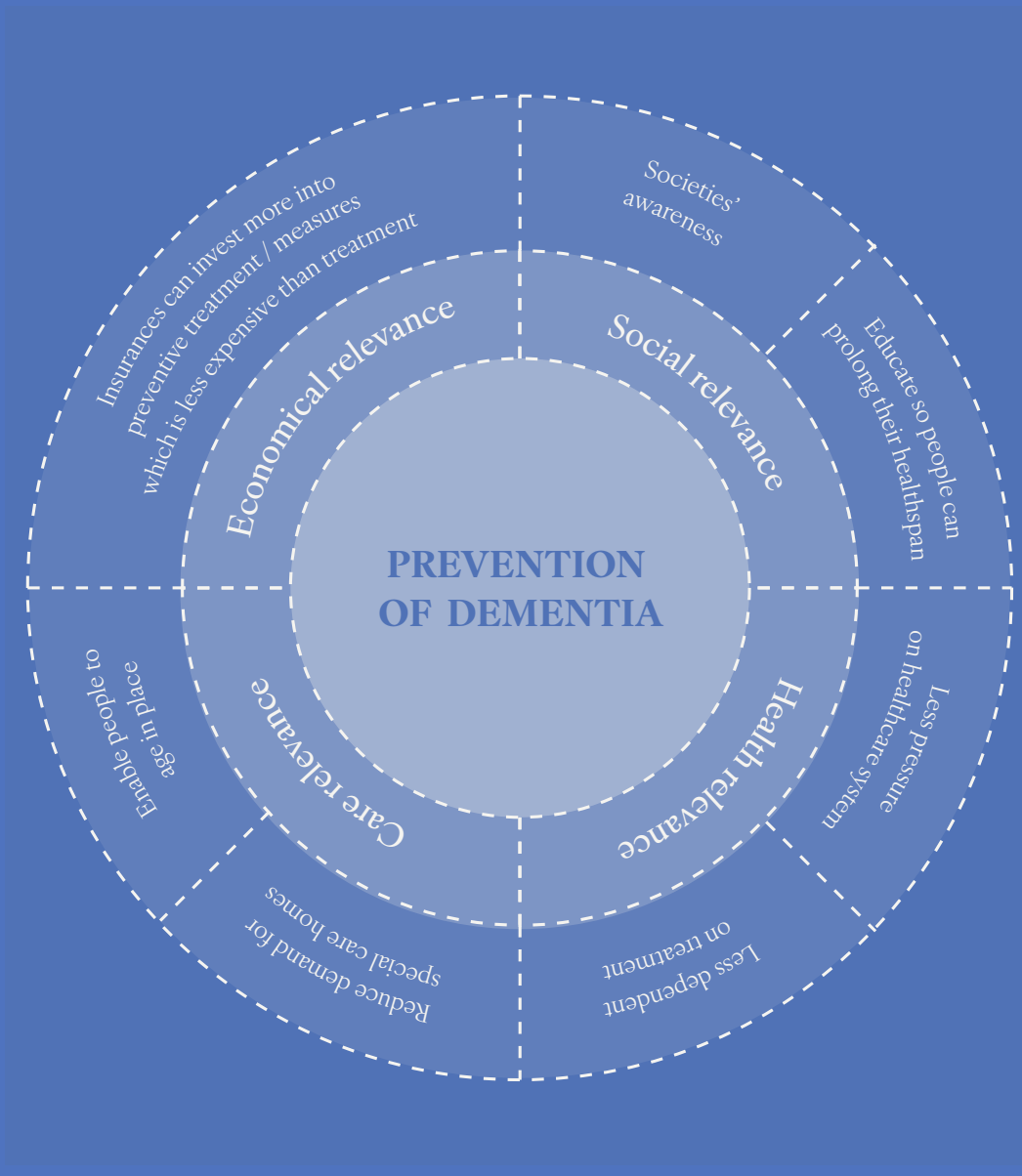


Figure 2: Four aspects why prevention of dementia is relevant for society, own diagram (2023).

THEORETICAL FRAMEWORK

LITERATURE STUDY

Extensive research is available about the influence of architecture on people suffering from dementia (e.g., Bowes & Dawson, 2019; Feddersen & Lüdtke, 2014; Fleming & Purandare, 2010; Nillesen & Opitz, 2014; Marquardt et al., 2014) and literature reviews about for example wayfinding for people with dementia (Marquardt, 2011). Most of these studies focus on what kind of architectural and design interventions could be implemented in current dementia care facilities in order to support the daily lives of people and extend the quality of their lives when people are already suffering from dementia and how to make them 'feel at home' and at ease while residing in those care facilities.

Additionally, a relevant topic to use in this research that has been studied in recent years is the concept of neuroarchitecture which focuses on the human perception of, and interaction with the surrounding architecture. It provides information about the understanding of our cognitive processes that could be inspiring for evidence-based architectural design principles (Wang et al., 2022). In recent years more research also became available on the integration of neuroarchitecture in design (Assem et al., 2023; Ritchie, 2020).

RESEARCH GAP

Even though a lot of research has been done on the topic of (neuro)architecture and dementia, not much research has been conducted on what architectural interventions could contribute to the prevention of dementia as research until now solely focuses on treatment and care for dementia sufferers. Therefore, this research will focus on that gap of investigating what architectural interventions can contribute to the prevention of dementia.

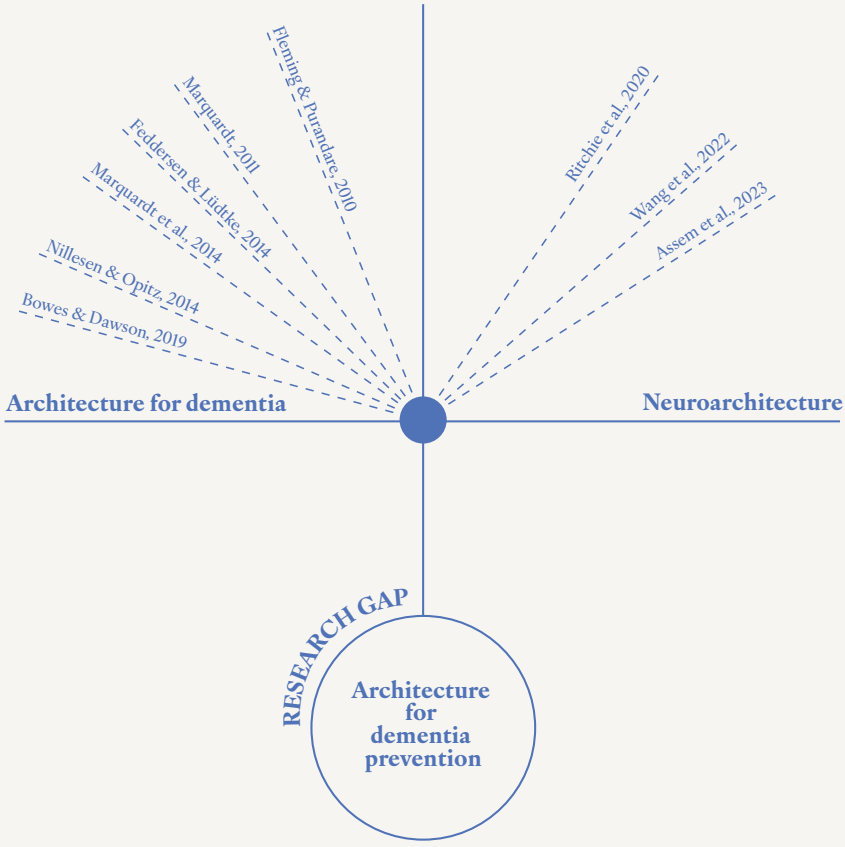


Figure 3: Summary literature study and research gap, own diagram (2023).

THEORETICAL FRAMEWORK

The theoretical framework of this research is aiming to describe previous studies that have already been conducted and researched the topic of this research; *how can architecture contribute to the prevention of dementia*. Two different research topics will be investigated that together form the foundation of this research in order to answer the main question: healthy living environment (designing for prolonging people's vitality) in connection to dementia prevention through architectural interventions within the built environment.

Healthy living environment

One of the important aspects of this research is to understand how our physical living environment and lifestyle have great influence on our health and well-being. One of the first urban planning concepts that promoted a healthier environment and played an important role in the urban planning of the 20th century was the garden city concept. It was founded by Ebenezer Howard. He proposed the idea of decentralization of cities and instead constructing garden cities that, with its spatial urban planning, create an environmentally friendly environment[23].

A more recent concept in this field has been developed by Carlos Mereno in 2016 which is called the '15-minute city'. Being inspired by Jane Jacob's (1961) book 'The death and life of great American cities', this concept advocates for human centered urbanism, where aspects such as socialization, self-actualization, cultural demand and health are accessible in short commutes. This means that the time required for people to access different nodes within urban spaces should be a priority[24].

A variation on the 15-minute concept is developed by Capasso Da Silva[25]. He claims that it is possible to plan cities that are accessible with a 20-minute threshold with all forms of transportation rather than solely using walking as a way of transportation[26]. These two concepts align since they both promote personal and societal wellbeing, improve liveability and emphasize accessibility as being a crucial element while wanting to reduce the need for mobility[27].

Walkable neighborhoods like the 15-minute city concept have also been researched in relation to the development of noncommunicable diseases (NCDs). This term refers to a group of conditions that are not primarily caused by an acute infection but rather are the result of long-term health consequences that are in need of treatment and care[28]. Dementia is also named by the World Health Organization as one of the five NCDs that are ranked in the top 10 causes of deaths globally[29]. Several studies have highlighted the reduce of NCDs in walkable neighborhoods[30] as more research has been conducted into the relationship of our living environment and our health because the world is facing unprecedented number of older adults and people with NCDs[31]. Weng et al (2019) advocated the walkable city as a way of promoting the health of its residents in order to void NCDs[32]. Therefore, recent urban concepts like the walkable 15-minute city entail crucial principles in the search towards creating a healthier living environment that contributes to disease prevention, especially for noncommunicable diseases like dementia.

23. Gatarić et al., 2019, p.34.
24. Allem et al., 2022, p.2.
25. Capasso Da Silva et al., 2019.
26. Stanley, 2015, p.3.
27. Moreno et al., 2021, p.97.
28. Noncommunicable diseases | Pan American Health Organizaion, n.d.
29. World Health Organization, 2020.
30. Weng et al., 2019.
31. Peters et al., 2019.
32. Weng et al., 2019.

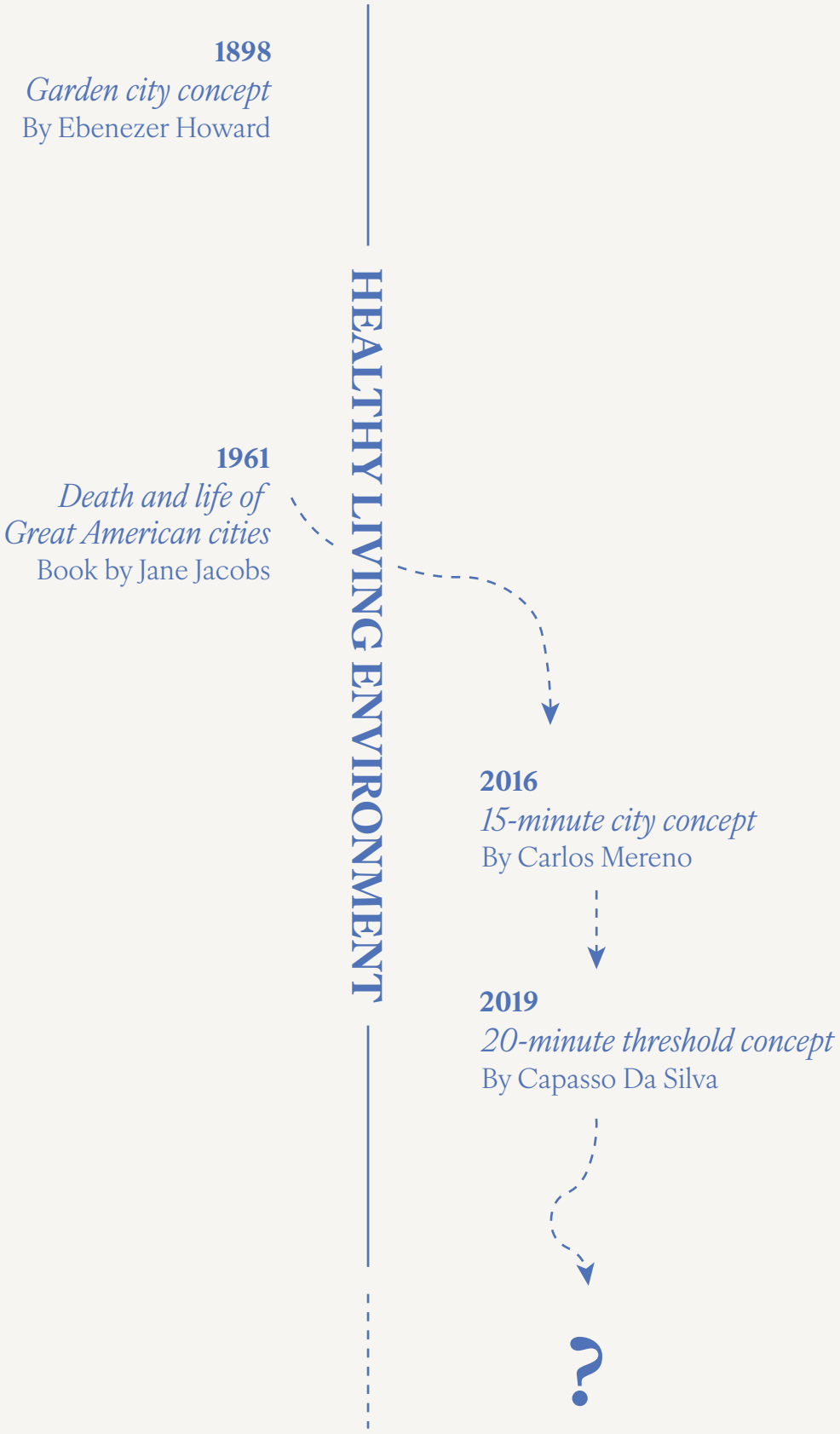


Figure 4: History of healthy living environment concept development, own diagram (2023).

DESIGN HYPOTHESIS

The intention of this research is to utilize the topic of preventing dementia through architectural interventions within our built environment as a starting point for a wider, more inclusive renewal of the built environment that could prevent us from getting sick as well as prolong our healthspan. By combining architectural interventions used in architecture for dementia and design principles for healthy living environments (such as the 15-minute city concept) to prolong people's vitality, a design toolkit can be developed that can create a healthy living environment that contributes to dementia prevention.

These design principles will be implemented in existing neighborhoods by using small scale interventions as an instrument to achieve this through multiple scales (building, street, area, neighborhood) in private dwellings, public buildings and shared outside spaces. Implementing the design principles into existing neighborhoods will ensure the prevention of dementia whilst prolonging people's healthspan and changes our current societies' perspective against elderly getting sick in order to shift it towards a more preventive orientated society that will be reflected into the healthy living environment.

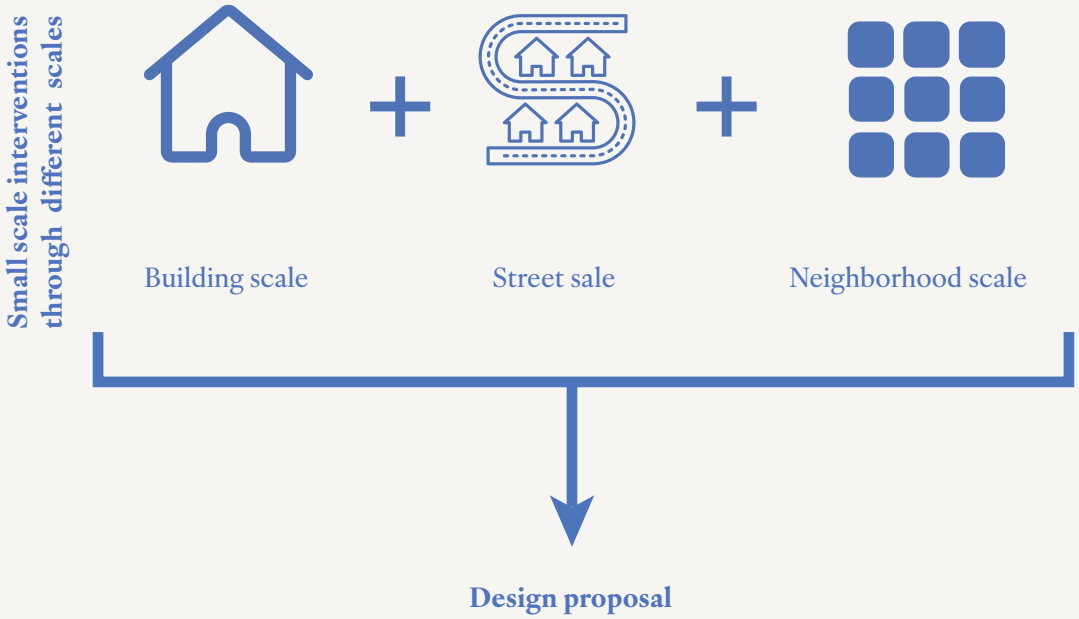


Figure 5: Visualisation of design hypothesis, own diagram (2023).

METHODOLOGY

This research will be conducted through multiple different methods. The three sub-questions will be divided into three representing chapters. However, all chapters start with a structured foundation of information gathered through literature research into the field of the specific research question.

In ***chapter 1***, the literature research will be used to gain an understanding on how dementia works (symptoms, characteristics, impairments) and continues by conducting research into the current living environment of people suffering from dementia. To research this, both case studies (current care facilities solely designed for dementia sufferers) will be researched as well as visiting two different dementia care facilities to observe and experience the daily lives of dementia sufferers and their living environment. The methodological approach that will be utilized is ethnography. Researchers normally implement this method in the anthropological research when studying communities or groups of people by spending a longer period of time living the daily lives with the group and observing their ordinary routines. They collect this through daily rituals, objects and processes by using photo's, journalling and drawings as recording their research in order to draw conclusions about the cultural and philosophical views and practices of the observed group[33]. This method could also be implemented for this research by observing a group of people that all have dementia to gather crucial information and insights; How does their current living environment looks like (drawing workshops, photographs), what is their daily routine (observations, interviews with caregivers and family members) and what is missing in their current living environment and could it be improved (observations, workshops and interviews with caregivers and family members). The collection of materials and experiences during the fieldwork week will be combined into a journal:

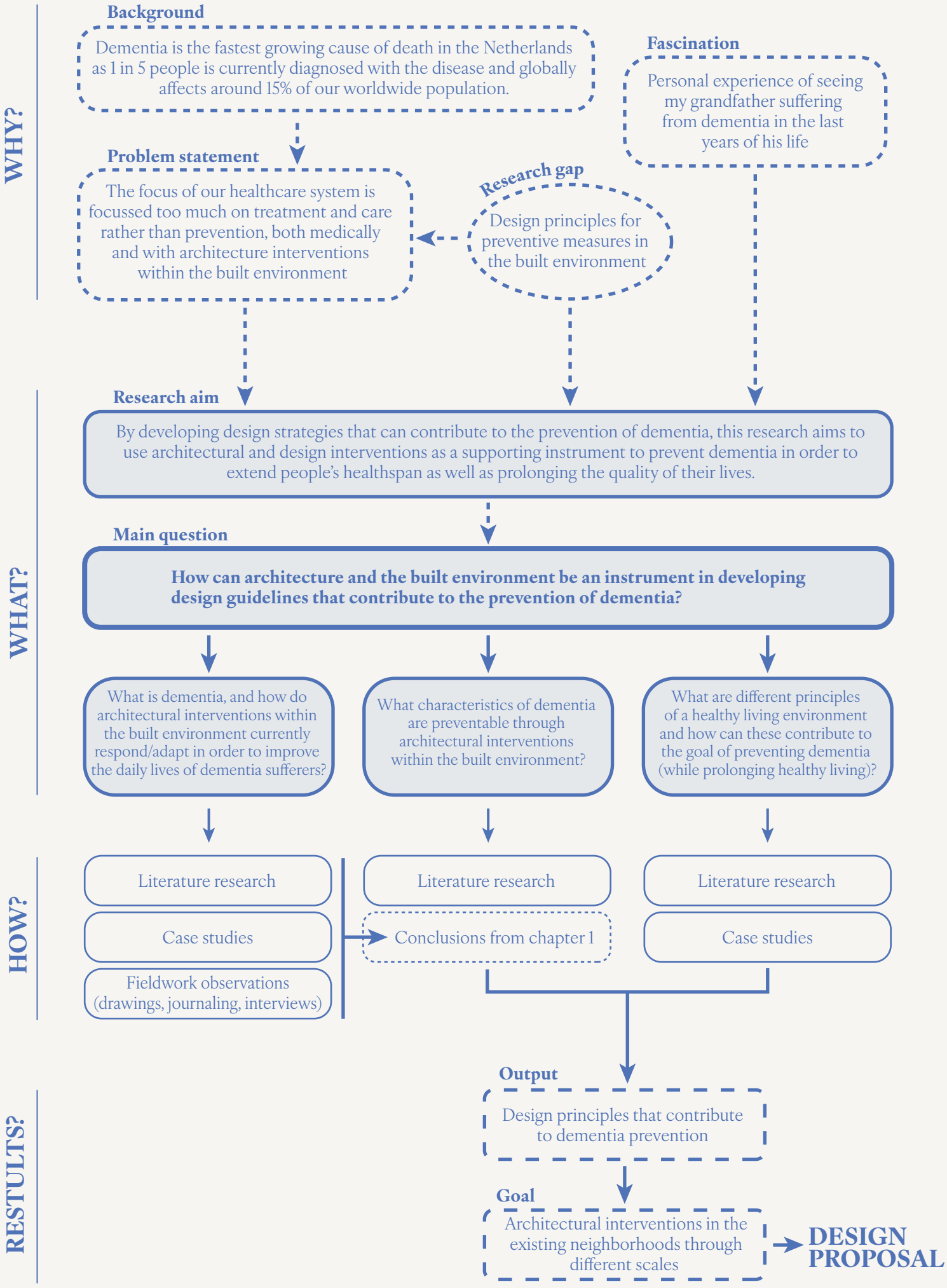
- Daily journal: a day in the life of a person suffering from dementia
- Photography of living environment
- Drawings and sketches of the patient's perspective on their living environment
- Drawings and sketches of my observations about the living environments
- Informal interviews with their caregivers (and family members) to understand more about the patient's needs

Chapter 2 will be used to retrieve information about what is already known about the prevention of this disease in the early stages, which characteristics of dementia could be prevented with architectural interventions and to what scales these need to intervene in the built environment to be beneficial in preventing those symptoms. This will be done by using literature sources and utilizing the found design principles from the case studies and fieldwork from chapter 1. These principles will be filtered to find out which of these architectural interventions could also be used as an instrument to prevent dementia.

Finally, in ***chapter 3***, the principle of a healthy environment will be defined by investigating three different case studies to investigate whether these can be applied to contribute to the prevention of dementia. The three concepts that will be compared are the 'Blue Zones' by Dan Buettner, 'The 15-minute city' by Carlos Moreno and the concept of 'neuroarchitecture' (the integration of Neuroscience and Architecture). This will be done by an analytical comparison in order to research what architectural interventions could contribute to the prolonging of people's healthspan while they are still vital and disease free. To do this, architectural features of these concepts will be examined such as the scale of intervention (city, neighborhood or building), spatial configurations and orientational methods (routing and wayfinding).

33. Lucas, 2016.

RESEARCH SCHEME



RESEARCH PLANNING

Site analysis

Gathering of literature

Research plan

RESEARCH QUESTION

How can architecture and the built environment be an instrument in developing design guidelines that contribute to the prevention of dementia?

What is dementia, and how do architectural interventions within the built environment currently respond/adapt in order to improve the daily lives of dementia sufferers?

What characteristics of dementia are preventable through architectural interventions within the built environment?

What are different principles of a healthy living environment and how can these contribute to the goal of preventing dementia (while prolonging healthy living)?

Site selection

FIELDWORK
(anthropological research)

Observing

Drawing
- Living environment
- People
- Routing

Journaling
- Daily life
- Wayfinding

Interacting

Interviews
- Caregivers
- Family members

Workshop
- Draw your room

Two dementia care facilities

Analysing

Delft West

Mapping
- 15-minute concept criteria
- Area
- Routing
- Demographics
- Potential transformation properties

Final site selection

CASE STUDIES

LITERATURE RESEARH

Graphic journal

Design guidelines

Preliminary design

Designing

Tranforming existing neigborhood by implementing small scale architectural interventions

Building scale

Street scale

Neighborhood scale

DESIGN PROPOSAL

P1

P2

P3

P4

KEY TERMS

Chronic diseases

The World Health Organization describes chronic diseases as: 'Diseases that are not passed from person to person. They are of long duration and generally slow progression. The four main types ... are cardiovascular diseases (like heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructed pulmonary disease and asthma) and diabetes[34]. However, The Centers for Medicare and Medicaid Services also include more chronic conditions such as Alzheimer's disease, depression and HIV to a more extensive list[35].

Dementia

Dementia is a syndrome that can be caused by numerous diseases which over time destroy nerve cells and damage the brain which typically leads to cognitive decline that go beyond the usual consequences of biological aging. The cognitive impairment is regularly accompanied by changes in mood, emotional control, behavior or motivation[36]. This results into the lack of ability to achieve daily tasks and routines such as dressing up, doing household chores, paying your bills and taking medication[37].

Healthspan

Healthspan is defined as 'the period of life spent in good health, free from the chronic diseases and disabilities of aging'[38].

Healthy living environment

The Dutch National Institute for Public Health and the Environment has defined 'a healthy living environment' as 'A healthy living environment is one that is clean and safe, protects against health risks and encourages exercise and socializing'[39]. It also should invite everyone to engage with each other while promoting healthy behaviors and is a pleasant place to live in[40].

Life expectancy

The World health organization defines this term as 'the number of years of life that can be expected on average in a given population'[41].

Lifespan

Lifespan is defined as 'the total amount of years you have lived'[42].

34. World Health Organization, 2023b.
35. Bernell & Howard, 2016.
36. World Health Organization, 2023a.
37. Factsheet Wat Is Dementie? | Alzheimer Nederland, n.d.
38. Kaeberlein, 2018, p. 361.
39. Healthy Living Environment Programme Launched | RIVM, n.d.
40. Healthy Living Environment | RIVM, n.d.
41. World Health Organization, 2004, p. 48.
42. Garmany et al., 2021, p. 56.

Longevity

Longevity is defined as living a longer and healthier life. It means both how long a person is living and how healthy their life will be. It includes three concepts, which is extending people's lifespan (life expectancy) as well as expanding their healthspan (living longer free of diseases) and aiming to control and reverse the hallmarks of aging[43].

Neuroarchitecture

Neuroarchitecture could be defined as 'any built environment which has been designed whilst following principles derived from neurosciences, thus helping to create spaces which benefit memory, improved cognitive capacity and mental stimulation, while simultaneously avoiding stress'[44].

Neurodegerenative diseases

Neurodegenerative diseases are defined as 'conditions that gradually damage and destroy parts of your nervous system, especially areas of your brain'. These conditions are known to slowly develop as the effects and symptoms tend to appear later in life. This term is not referring to a single type of condition but is an umbrella term that applies to several types of conditions among them being dementia-type diseases (Alzheimer's disease, frontotemporal dementia, chronic traumatic encephalopathy, Lewy body dementia and limbic predominant age-related TDP-43 encephalopathy)[45].

Prevention

The World Health Organization defines prevention as approaches and activities that aim to reduce the likelihood that a disease or disorder will affect an individual, interrupting or slowing the progress of the disorder or reducing disability. They distinguish primary prevention as reducing the likelihood of the development of a disease or disorder. Secondary prevention aims at interrupting, preventing or minimizing the progress of the disease or disorder at an early stage and tertiary prevention focuses on the halting of the progression once damage is already done[46].

Quality of life

The World Health Organization defines the term quality of life as 'the individuals' perception of their position in life in the context of culture and value systems in which they live and in relation to their goals, expectations, standards and concerns'. They also state that it is a broad ranging concept that incorporates in a complex way the persons' physical health, psychological state, level of independence, social relationships, personal beliefs and their relationship to salient features of the environment[47].

43. What Is Longevity and How Can You Live Beyond Your Life Expectancy by 10+ Years?, n.d.
44. Neuroarchitecture | United Workplace, n.d.
45. Cleveland Clinic Medical, n.d.
46. World Health Organization, 2004, p. 50.
47. "World health Organization Quality of Life", 2023, p. 11.

BIBLIOGRAPHY

KEY TERMS REFERENCES

Bernell, S., & Howard, S. W. (2016). Use your words carefully: What is a chronic disease? Frontiers in Public Health, 4. https://doi.org/10.3389/fpubh.2016.00159

Cleveland Clinic Medical. (n.d.). Neurodegenerative diseases. Cleveland Clinic. https://my.clevelandclinic.org/health/diseases/24976-neurodegenerative-diseases

Factsheet wat is dementie? | Alzheimer Nederland. (n.d.). Alzheimer Nederland. https://www.alzheimer-nederland.nl/dementie/factsheet-dementie

Garmany, A., Yamada, S., & Terzic, A. (2021). Longevity leap: mind the healthspan gap. Npj Regenerative Medicine, 6(1). https://doi.org/10.1038/s41536-021-00169-5

Healthy living environment | RIVM. (n.d.). https://www.rivm.nl/en/healthy-living-environment#:~:text=A%20healthy%20living%20environment%20is,and%20social%20environment%20on%20health.

Healthy Living Environment programme launched | RIVM. (n.d.). https://www.rivm.nl/en/news/healthy-living-environment-programme-launched#:~:text=A%20healthy%20living%20environment%20is,to%20design%20the%20PGLO%20together.

Kaeberlein, M. (2018). How healthy is the healthspan concept? GeroScience, 40(4), 361–364. https://doi.org/10.1007/s11357-018-0036-9

Neuroarchitecture | United Workplace. (n.d.). The United Workplace. https://www.theunitedworkplace.com/Insights/Neuroarchitecture

What is Longevity and How Can You Live Beyond Your Life Expectancy by 10+ Years? (n.d.). https://www.healthylongevity.clinic/blog/what-is-longevity-definition

World Health Organization. (2004). WHO Global Forum IV on Chronic Disease Prevention and Control. In World Health Organization (ISBN 92 4 159316 4). https://iris.who.int/bitstream/handle/10665/43208/9241593164_eng.pdf;sequence=1

World Health Organization. (2023a). Dementia. www.who.int. https://www.who.int/news-room/fact-sheets/detail/dementia

World Health Organization. (2023b). Noncommunicable diseases. www.who.int. https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases

World Health Organization Quality of Life (WHOQOL). (2012). In https://www.who.int (WHO/HIS/HSI Rev.2012.03). World Health Organization. https://www.who.int/publications/i/item/WHO-HIS-HSI-Rev.2012.03

RESEARCH PLAN REFERENCES

1 op de 5 mensen krijgt dementie | Alzheimer Nederland. (n.d.). Alzheimer Nederland. https://www.alzheimer-nederland.nl/stop-dementie/1-op-de-5-mensen-krijgt-dementie#:~:text=1%20op%20de%205%20mensen%20in%20Nederland%20krijgt%20dementie.,langzaam%20jezelf%20en%20elkaar%20verliest.

Allam, Z., Bibri, S. E., Chabaud, D., & Moreno, C. (2022). The '15-Minute City' concept can shape a net-zero urban future. Humanities and Social Sciences Communications, 9(1). https://doi.org/10.1057/s41599-022-01145-0

Assem, H. M., Khodeir, L., & Fathy, F. (2023). Designing for human wellbeing: The integration of neuroarchitecture in design – A systematic review. Ain Shams Engineering Journal, 14(6), 102102. https://doi.org/10.1016/j.asej.2022.102102

Attia, P., & Gifford, B. (2023). Outlive: The Science - and Art - of Longevity. Vermilion.
Bowes, A., & Dawson, A. (2019). Designing Environments for People with Dementia. In Emerald Publishing Limited eBooks. https://doi.org/10.1108/9781787699717

Bowes, A., & Dawson, A. (2019). Designing Environments for People with Dementia. In Emerald Publishing Limited eBooks. https://doi.org/10.1108/9781787699717

Can dementia be prevented? | NHS. (2023, August 18). nhs.uk. https://www.nhs.uk/conditions/dementia/about-dementia/prevention/

Centraal Bureau voor de Statistiek. (2023, October 1). Opnieuw meer mensen overleden na een val. Centraal Bureau Voor De Statistiek. https://www.cbs.nl/nl-nl/nieuws/2023/40/opnieuw-meer-mensen-overleden-na-een-val

Centraal Bureau voor Statistiek. (2017, July 19). One in ten deaths attributed to dementia. Centraal Bureau Voor Statistiek. https://www.cbs.nl/en-gb/news/2017/29/one-in-ten-deaths-attributed-to-dementia

Da Silva, D. C., King, D. A., & Lemar, S. V. (2019). Accessibility in practice: 20-Minute City as a sustainability Planning goal. Sustainability, 12(1), 129. https://doi.org/10.3390/su12010129

Dorsey, E. R., Glidden, A. M., Holloway, M., Birbeck, G. L., & Schwamm, L. H. (2018). Teleneurology and mobile technologies: the future of neurological care. Nature Reviews Neurology, 14(5), 285–297. https://doi.org/10.1038/nrneurol.2018.31

Factsheet cijfers en feiten over dementie | Alzheimer Nederland. (n.d.). Alzheimer Nederland. https://www.alzheimer-nederland.nl/factsheet-cijfers-en-feiten-over-dementie

Factsheet dementie | Vektis. (2022, January 24). Vektis. https://www.vektis.nl/intelligence/publicaties/factsheet-dementie

Feddersen, E., & Lüdtke, I. (2014). Lost in space: Architecture and Dementia. Birkhauser Architecture.

Feigin, V., Vos, T., Nichols, E., Owolabi, M., Carroll, W. M., Dichgans, M., Deuschl, G., Parmar, P., Brainin, M., & Murray, C. J. L. (2020). The global burden of neurological disorders: translating evidence into policy. Lancet Neurology, 19(3), 255–265. https://doi.org/10.1016/s1474-4422(19)30411-9

Fleming, R., & Purandare, N. (2010). Long-term care for people with dementia: environmental design guidelines. International Psychogeriatrics, 22(7), 1084–1096. https://doi.org/10.1017/s1041610210000438

Garmany, A., Yamada, S., & Terzic, A. (2021). Longevity leap: mind the healthspan gap. Npj Regenerative Medicine, 6(1). https://doi.org/10.1038/s41536-021-00169-5

Gatarić, D., Belij, M., Đerčan, B., & Filipović, D. (2019). The origin and development of Garden cities: An overview. Zbornik Radova - Geografski Fakultet Univerziteta U Beogradu, 67–1, 33–43. https://doi.org/10.5937/zrgfub1901033g

Jacobs, J. (1961). The death and life of great American cities.

Lessons Learned from Desmond Tutu | Time. (2021, December 31). Time. https://time.com/6132224/desmond-tutu-bono/

Lucas, R. (2016). Research methods for architecture. Laurence King Publishing.

Marquardt, G. (2011). Wayfinding for People with Dementia: A Review of the Role of Architectural Design. Herd: Health Environments Research & Design Journal, 4(2), 75–90. https://doi.org/10.1177/193758671100400207

Marquardt, G., Bueter, K., & Motzek, T. (2014). Impact of the Design of the Built Environment on People with Dementia: An Evidence-Based Review. Herd: Health Environments Research & Design Journal, 8(1), 127–157. https://doi.org/10.1177/193758671400800111

Moreno, C., Allam, Z., Chabaud, D., Gall, C. L., & Pratlong, F. (2021). Introducing the "15-Minute City": Sustainability, resilience and place Identity in future Post-Pandemic Cities. Smart Cities, 4(1), 93–111. https://doi.org/10.3390/smartcities4010006

Nillesen, J. L. a. R., & Opitz, S. (2014). Dimensie voor dementie. Denkbeeld, 26(2), 4. https://doi.org/10.1007/s12428-014-0026-3

Noncommunicable diseases | Pan American Health Organization. (n.d.). PAHO/WHO | Pan American Health Organization. https://www.paho.org/en/topics/noncommunicable-diseases#:~:text=The%20term%20NCDs%20refers%20to,diabetes%20and%20chronic%20lung%20illnesses.

Pascoe, R. (2022, May 17). Dutch healthcare system needs "rigorous change" to focus on prevention - DutchNews.nl (By DutchNews). DutchNews.nl. https://www.dutchnews.nl/2022/05/dutch-healthcare-system-needs-rigorous-change-with-focus-on-prevention/

Peters, R., Ee, N., Peters, J., Beckett, N., Booth, A., Rockwood, K., & Anstey, K. J. (2019). Common risk factors for major noncommunicable disease, a systematic overview of reviews and commentary: the implied potential for targeted risk reduction. Therapeutic Advances in Chronic Disease, 10, 204062231988039. https://doi.org/10.1177/2040622319880392

Ranglijsten | Aandoeningen op basis van zorguitgaven | Volksgezondheid en Zorg. (n.d.). Volksgezondheid En Zorg. https://www.vzinfo.nl/ranglijsten/aandoeningen-op-basis-van-zorguitgaven#:~:text=De%20top%20drie%20van%20de,miljard%2C%204%2C3%25).

Relatie tussen gezonde leefomgeving en kanker, overgewicht en dementie | RIVM. (n.d.). https://www.rivm.nl/documenten/relatie-tussen-gezonde-leefomgeving-en-kanker-overgewicht-en-dementie

Ritchie, I. (2020). Neuroarchitecture: Designing with the Mind in Mind. John Wiley & Sons.

Stanley, J. (2015). Connecting neighbourhoods: The 20 minute city. Bus and Coach Industry Policy paper 4. ResearchGate. https://doi.org/10.13140/RG.2.1.1557.7129

Wang, S., De Oliveira, G. S., Djebbara, Z., & Gramann, K. (2022). The Embodiment of Architectural Experience: A Methodological Perspective on Neuro-Architecture. Frontiers in Human Neuroscience, 16. https://doi.org/10.3389/fnhum.2022.833528

Weng, M., Ding, N., Li, J., Jin, X., He, X., He, Z., & Su, S. (2019). The 15-minute walkable neighborhoods: Measurement, social inequalities and implications for building healthy communities in urban China. Journal of Transport & Health, 13, 259–273. https://doi.org/10.1016/j.jth.2019.05.005

Werkdruk en arbeidstevredenheid in de zorg | CBS. (2022). Centraal Bureau Voor De Statistiek. https://www.cbs.nl/nl-nl/longread/statistische-trends/2022/werkdruk-en-arbeidstevredenheid-in-de-zorg?onepage=true

What is dementia? | Alzheimers.gov. (n.d.). https://www.alzheimers.gov/alzheimers-dementias/what-is-dementia

World Health Organization. (2020). The top 10 causes of death. https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death

World Health Organization. (2021). Dementia. www.who.int. https://www.who.int/news-room/facts-in-pictures/detail/dementia#:~:text=The%20number%20of%20people%20living,for%20their%20caregivers%20and%20families.

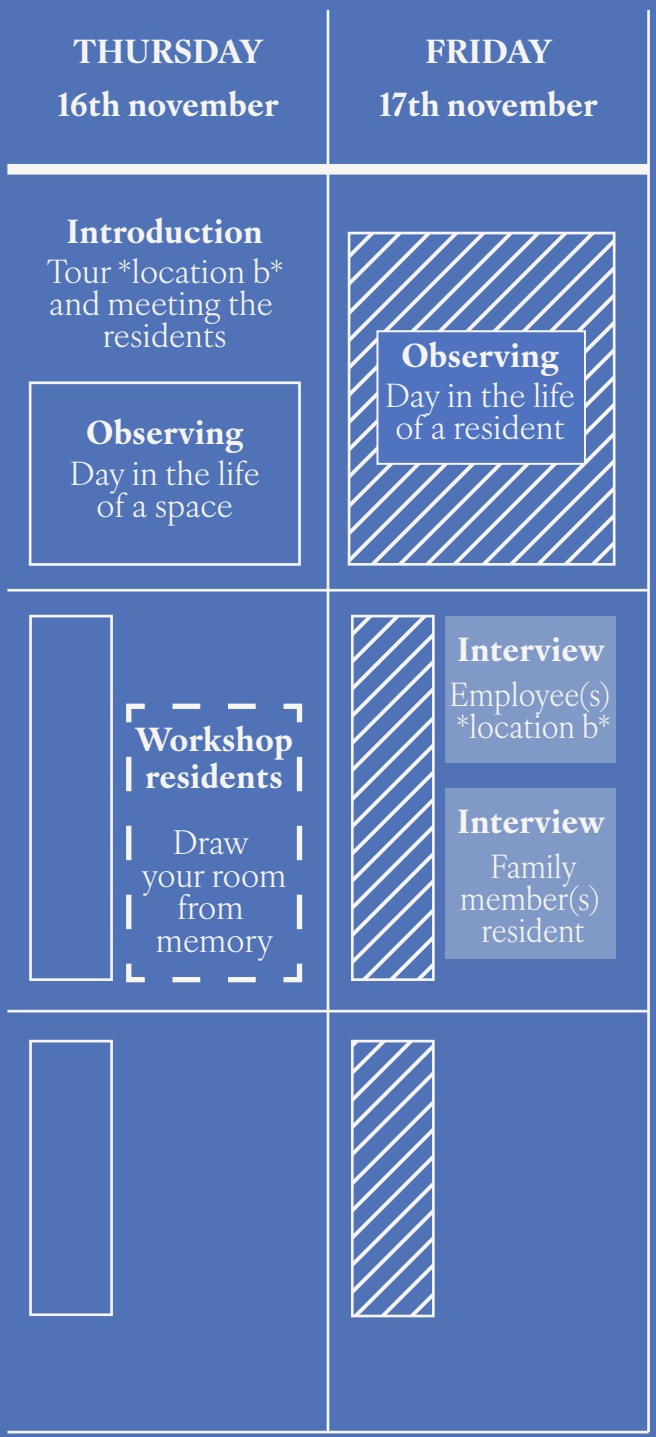
World Population Prospects 2022: Summary of Results. (2022).

APPENDIX

FIELDWORK PLANNING

	MONDAY 13th november	TUESDAY 14th november	WEDNESDAY 15th november
MORNING	**Introduction** Tour *location a* and meeting the residents **Observing** Day in the life of a space	**Observing** Day in the life of a resident	**Interview** founder *location a*
AFTERNOON	**Interview** Family member(s) resident	**Workshop daycare** Draw your room from memory	**Interview** Employee(s) *location a*
EVENING		**Workshop residents** Draw your room from memory	

LOCATION A



LOCATION B

WEEK PLANNING

We are planning on visiting two different care facilities that are solely for people suffering from dementia. On both locations we will be conducting the same interviews and workshops in order to distinguish differences and / or similarities between the two locations after visiting them (concept, size, type of care, daily routines etc.). In this diagram we have displayed what we are planning to do during this fieldwork week on both different locations.

FIELDWORK INTERVIEW

The questions stated below are a starting point for the interviews. However, the interview will also be guided by what the person in question has to say. Additional questions will be devised on the spot, which can later be read in the transcript. We will interview various people, including the owners of the healthcare institution, healthcare workers, volunteers and relatives of residents.

GENERAL

- Wie bent u?
- Wat is uw functie binnen deze *locatie*?
- Beschrijf de *locatie* in 3 woorden?
- Hoe ziet u de balans voor zich tussen bescherming en vrijheid van de bewoners? (Hoe ver ga je voor hun veiligheid?)
- Is het een open of gesloten woning?

CONCEPT BUILDING

- Hoelang blijven mensen daar wonen?
- Kunnen ze blijven wonen tot het einde van hun leven?
- Hoe wordt er beslist wie er wel of niet kan wonen (indicatie / sollicitatie)?
- Welk stadium van dementie hebben mensen hier?
- Wonen mensen met verschillende stadia met elkaar?
- Kunnen mensen daar samenwonen met een partner?

DAILY LIFE OF RESIDENTS

- Op wat voor manier worden deze mensen gestimuleerd/actief gehouden?
- Hoeveel doen deze mensen zelf? Waar moeten ze bij geholpen worden?
- Kunnen de bezoekers altijd langskomen (specifieke bezoekuren)?

FAMILY MEMBERS OF RESIDENTS

- Voelt u zich hier op u gemak als u uw familieleden bezoekt?
  - Zo ja / nee, wat draagt bij aan dit gevoel?
- Hoe verliep het proces om toekomstige woonmogelijkheden te overwegen?
- Waarom is er voor deze *woonlocatie* gekozen?
  - Is er gezocht naar opties die er niet (in de buurt) waren?
  - Komt de bewoner uit deze regio?

DESIGN LIVING ENVIRONMENT

- Hoe denkt u dat het verschilt ten opzichte van andere zorginstellingen?
- Zijn er speciale ontwerpelementen toegevoegd aan deze locatie om bij te dragen aan het verlichten van de symptomen?
- Waarom is er gekozen voor een woning in combinatie met een boerderij?
- Wat is het voordeel van kleinschalig wonen?
- Hoe denkt u dat de leefomgeving waarin de woning zich bevindt, bijdraagt aan het welzijn van de bewoners?
- Is de locatie gekozen om zijn leefomgeving of is deze ingericht naar wens?
- Wat maakt een kamer voor bewoners met dementie uniek (ontwerp)?
- Zijn er specifieke momenten op de dag waarop problemen zich voordoen?
    - Speelt de leefomgeving daar een rol in?
- Zijn er ontwerpelementen die je mist die zouden kunnen bijdragen aan het dagelijkse ritme van de bewoners (routing, vorm van ruimtes etc.)?

CAREGIVER

- Vanaf welk punt zie je dat ouderen met dementie jouw intensievere zorg nodig hebben?
    - Welke dingen kunnen ze nog wel zelfstandig?
- Wat zijn jouw taken?
    - Hoe ziet je dag eruit?
- Zijn er situaties waarbij beide van het stel samen in dezelfde zorginstelling wonen?
    - Gebeurt dit wel eens en wat zijn volgens jou de voor en nadelen?
- Kunnen ouderen met dementie het beste zo lang mogelijk thuis wonen, of beter vroeg naar een zorginstelling om daar te wennen?
- Hoe zou jij als officiële zorgverlener kunnen samenwerken met een mantelzorger?

PARTNERS

- Wat is de impact op je leven om een partner te hebben met dementie?
    - Waaraan merk je dit het meest?
- Wat zijn de uitdagingen om met iemand dementie te wonen?
- Heb je weleens afstand nodig van je partner met dementie?
    - Hoeveel afstand heb je nodig?
- Zou je ook in latere fases van de dementie nog met je partner samen kunnen/willen wonen?
    - Waarom zou dat wel/niet kunnen?
    - Hoe zou dat eruit zien?
- Denk je dat het bevorderlijk is voor het welzijn van je partner om samen te blijven wonen?