



Collective housing projects for happy elderly

An exploratory research into collective housing as places for ageing and the importance of the key-elements of ageing in place

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Abstract:

This research explores the relationship between collective housing and happiness among elderly residents of collective housing in the Netherlands, focusing on the key elements of ageing in place. The study's relevance lies in addressing loneliness and enhancing the quality of life for older adults, which is a significant concern in Dutch society. The primary objective of this research was to uncover the importance of the key-elements of ageing in place and their influence on happiness and willingness to move. Data was collected by means of a survey consisting of statements regarding the five key-elements of ageing in place: Role of place, social networks, technology, support, and personal characteristics. In order to come to results, multiple linear regression was used to uncover the relations between the key-elements, happiness and willingness to move. The findings reveal that role of place and personal characteristics significantly positively impact happiness. Social networks and role of place positively influence the willingness to stay, whereas support shows a negative influence. Technology did not significantly affect happiness or willingness to stay. The research indicates that not all key elements equally contribute to happiness, with role of place and personal characteristics being the most important. This suggests that improving the physical and emotional connection to the place and maintaining personal resilience and adaptability are crucial for enhancing the well-being of older adults in collective housing. The study also highlights the need for better integration of technology to support ageing in place effectively.

Key words: Ageing in place, collective housing, ageing population, social networks, personal characteristics, technology, support, role of place

Preface

Before you lies what will likely be the magnum opus of my academic career, it is the accumulation of a lot of hard work, stress and lost hours of sleep. This master's thesis marks the end of my student career, a time I mostly thoroughly enjoyed. In this preface I would like to thank my supervisor, Ward Rauws for helping me massively during the research process, particularly when I had completely lost confidence in my own ability to write a thesis. The feedback I received in the many meetings we had was of great help. Secondly I want to thank every single respondent that took the time to participate in the survey, as well as the housing corporations, knowledge platforms and individuals who shared my questionnaire and made this research possible. Lastly I want to thank my friends that helped me during the research process, especially Lareen, Vincent and Alwin.

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1. Introduction

1.1 Background and relevance.

The world population is ageing, and for the Netherlands, it is expected that over a quarter of the population will be older than 60 years of age in 2030 (van den Berg et al., 2021). According to the central bureau for statistics (CBS), the grey pressure in the Netherlands will rise substantially. Grey pressure is the amount of people over the age of 65 as a percentage of the working population (20 to 64 year olds). The projected grey pressure of the Netherlands is expected to be 50% in 2070 (CBS, 2024).

In the Netherlands, the elderly population is encouraged to live independently, in their own home, for longer, due to so called ageing-in-place policies (Zantinge et al., 2011; Planbureau voor de Leefomgeving, 2019). As a consequence, increasingly fewer people are moving into retirement homes. The Dutch government's aim is to cut back on healthcare costs and the cost of the housing that comes with it (Van Den Berg et al., 2023). As a result of the Dutch policy of encouraging ageing in place, more elderly people will be living at home on their own.

Grey pressure

Number of over-65s relative to number of 20 to 64-year-olds

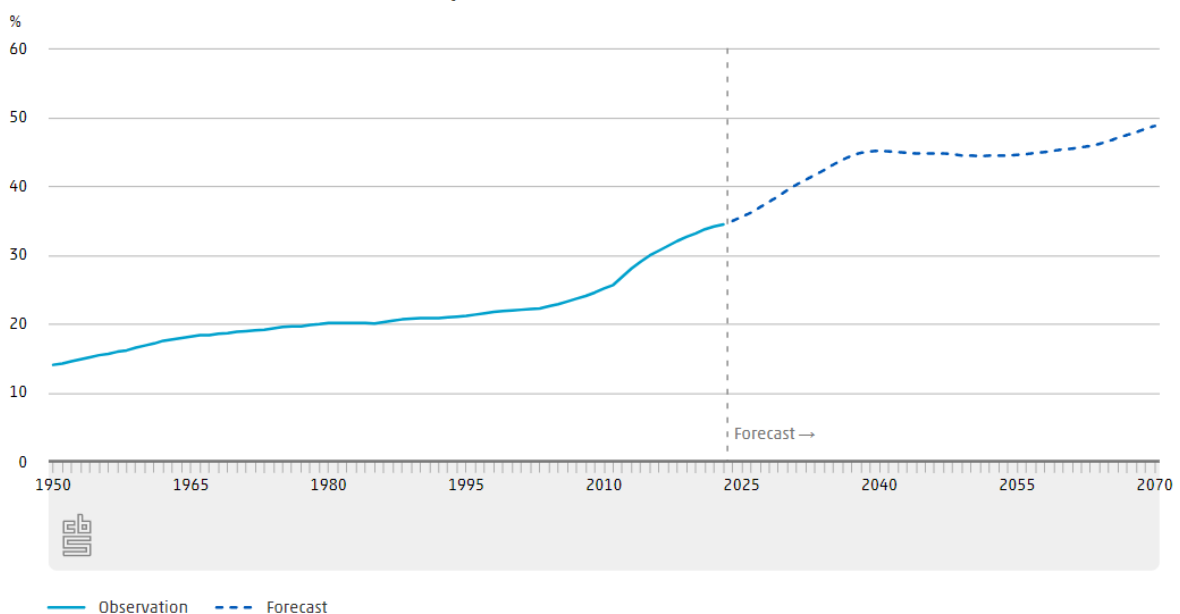


Figure 1: Grey pressure in the Netherlands, observation and forecast (taken from CBS, 2024)

Loneliness among older inhabitants is a well-known problem in the Netherlands with about 30% of Dutch adults feeling loneliness in their everyday lives, most of these people are either young adults or the elderly population (Zantinge, et al., 2011; van Tilburg, 2019). Older people experience more loneliness due to becoming less mobile, loss of their social network and overall becoming more

dependent on others (Zantinge *et al.*, 2011). In addition, for older adults that remain living at home when ageing, it is important to maintain a sense of self-esteem, for example by staying active in the community and maintaining a degree of independence (Buffel and Phillipson, 2023). This becomes increasingly harder to do for less mobile, more dependent older adults. One proposed solution for decreasing feelings of loneliness and maintaining a higher degree of independence among the elderly population is the development of alternative ways of housing. Collective housing, or cohousing for short is one of them and refers to people opting to live together on a plot of land or in a complex, with a great emphasis on community (Czischke *et al.*, 2023). This thesis will investigate the potential suitability of collective housing projects for ageing in place.

More recent, there have been studies done about the effect of living in a collaborative housing project on the (absence) of feelings of loneliness among Dutch older adults living within these projects (Glass, 2020; Van Den Berg *et al.*, 2023). In these studies it was found that living in a collaborative housing project has a positive effect on the perceived feelings of social loneliness of older adults. Van den Berg *et al.* (2021), found that there was a higher level of social cohesion within the projects, which decreased resident's feelings of loneliness. The social satisfaction of the residents was also found to be (indirectly) positively affected. Glass (2020) found that residents of collective housing neighbourhoods reported feeling less lonely. It can thus be stated that collective housing can decrease feelings of loneliness among older residents. However, reducing feelings of loneliness, although important, is not the only challenge when ageing in place. According to Pani-Harreman *et al.* (2021), there are five key-elements which are important for ageing in place and these five elements play important roles in enabling people to comfortably grow old in their own home. These five key-elements of ageing in place are: Role of place, social networks, support, technology and personal characteristics.

1.2 Research aim

This research aims to identify how the five key-elements of ageing in place are experienced by people living in collective housing, and in turn, if this affects the happiness of residents of collective housing projects. One of the key-elements that is identified by Pani-Harreman *et al.* (2021), is personal characteristics. As personal characteristics differ from one person to another, and relate mostly to adaptability, resilience and independence (Grimmer *et al.*, 2015), these feelings are unlikely to be affected by living in collective housing with the possible exception of independence. The resilience and adaptability of an individual can have a significant effect on how they perceive life, handle obstacles and view the world (Jefferies *et al.*, 2022). Therefore this research aims to uncover whether personal characteristics influences the other four key-elements of ageing in place.

Secondly, happiness is included in this research, as happiness is generally associated with higher life satisfaction, quality of life, and better health (Gundelach and Kreiner, 2004; Prati, 2022; Steptoe, 2019), it was deemed as a good outcome variable for this research. Simply put: If people in cohousing report higher scores for the key-elements of ageing in place, it is expected that they will also report higher scores for their overall happiness.

And lastly this research will look at resident's willingness to move out of their collective housing project. As there are five key-elements of ageing in place (Role of place, Technology, Social networks, Support and Personal characteristics) it would be expected that when these five key-elements are not experienced positively, resident's are more likely to want to move away as an absence of the five key-elements would mean that their collective housing project is not suitable for ageing in place.

This brings us to the main question this research aims to answer:

How does collective housing influence happiness for people ageing in place?

In order to provide the research with structure, the main research question has been divided into four sub-questions:

- 1. What are the key-elements of ageing in place?***
- 2. What is the effect of the five key-elements of ageing in place on happiness as experienced by people living in collective housing?***
- 3. Do personal characteristics influence the scores of other key-elements of ageing in place in collective housing?***
- 4. When inhabitants of collective housing projects are less satisfied with the different key-elements of ageing in place, does this desire to move?***

The first sub-question is aimed at explaining the key-elements of ageing in place as per the existing literature, the second sub-question aims to connect the literature to practice. In order to be able to find out how the key aspects of ageing in place are experienced by residents of collective housing projects, the collected answers of a questionnaire will be used, this will be further elaborated upon in chapter 3, methodology. In order to determine the importance of the key aspects of ageing in place, it will be determined whether they play a significant role in influencing the happiness of an individual. The third sub-question looks at the role of an individual's personal characteristics in relation to the other key aspects of ageing in place and looks to uncover whether personal characteristics influence the other key aspects of ageing in place. The last sub-question looks at the role the key-elements play in influencing a resident's desire to move away from the collective housing project they live in.

2. Theoretical Framework

This research looks at the suitability of collective housing for ageing in place. And what the important factors are when creating places that are friendly for ageing people. In order to fully understand how collective housing can contribute to an ageing-friendly living environment, it is important to know what ageing in place is and what the key elements of ageing in place are. Therefore, in this chapter, the concept of ageing in place will be explained, as well as the key elements that are important for ageing in place (2.1). After that, the notion of collective housing will be introduced as a possible avenue for ageing in place and it will be explained how collective housing can affect the key elements of achieving ageing in place (2.2). The chapter concludes with a conceptual model and hypotheses (2.3).

2.1 Ageing in Place

2.1.1 The definition of Ageing in Place

Increasingly more older citizens of the Netherlands are living independently, in their own homes, for longer amounts of time. On top of that, the population of people that are over the age of 65 in the Netherlands is growing rapidly, expected to reach 4.6 million people in 2050, with over 40% of them being over 80 years old (Zantinge et al., 2011). The vast majority of this population is expected to live independently in their own home, with only five per cent of this population living in care or nursery homes as of 2011, a trend that is expected to continue in the future. Across the European Union, the life expectancy of people is rising. To illustrate, in 2010, there were 1.743 people aged over a hundred years old in the Netherlands, as of 2023, this number is 2.572 (C. B. voor de S. CBS, 2023; Zantinge et al., 2011). This statistic illustrates that there are not only more elderly people, but the elderly will also be around for longer amounts of time. The Dutch government not only promotes ageing in place, but it is also the preference for most Dutch older adults. But what exactly does ageing in place mean?

In the book "Ageing in Urban Environments" by Buffel and Phillipson (2023), ageing in place is described as: ***"One's journey to maintain independence in one's place of residence as well as to participate in one's community"*** -Buffel and Phillipson, 2023, p. 8. The concept of the journey encompasses the transformative processes an individual experiences throughout the course of aging, please note that ageing in place is a process. Another key component of the definition is place, represented by both the location and design of the residence as well as community. Ageing in place not only means living at home, but remaining a part of the community is also an important aspect of ageing in place. (older) people need to maintain meaningful relationships. The importance of place can, according to Buffel and Phillipson (2023), be seen as both the physical space itself and the attachment to place. It is critical

for the elderly to feel competent and in control. The social networks of the elderly can play a significant role in their lives. Contacts with family, neighbours and friends are of great importance and can play a role in supporting the elderly. Therefore, Buffel and Phillipson's definition incorporates place attachment, as well as community attachment. An older definition of ageing in place, by Horner and Boldy (2008), states that: "**Ageing-in-place meets the needs of the older person, supporting them to live independently, or with some assistance, for as long as possible**" -Horner and Boldy, 2008, p. 356. This definition focuses on remaining in the same residence, for as long as an individual can. There seems to be an emphasis on independence, as well as a possibility for care assistance without moving into a nursing home. The definition starts by stating that the needs of an older individual, refer to forms of care an individual could need, hence the mentioning of assistance.

As different papers thus use different definitions of what ageing in place entails, this research uses the following definition:

Choosing to live as independently as possible in one's residency and community for as long as possible.

This definition follows from the two aforementioned definitions (Horner and Boldy, 2008 and Buffel and Phillipson, 2023) and contains both the individual's needs as well as their community. On top of that, this definition also incorporates that ageing in place is a choice, rather than the absence of a response to ageing. This differentiation, made by Lebrusán and Gómez (2022), was also deemed important by the researcher as ageing in place has far-reaching consequences for one's own life as well as his/her surroundings and ageing in place takes a commitment.

2.1.2 The Five Key Elements of Ageing in Place

In the previous part of this research, definitions of ageing in place were explored. From these definitions, it becomes clear that ageing in place consists of multiple key elements, which will be explained in this upcoming paragraph.

Pani-Harreman et al. (2021), identify five key elements of ageing in place in their literature study, these five key elements are as follows: 1. The role of place, 2. Social networks, 3. Support, 4. Technology and last 5. Personal characteristics. As the study done by Pani-Harreman et.al has been very influential, having been cited over 180 times since its publication in 2021 on Google Scholar alone, as well as being mentioned as one of the main sources of information on multiple other influential studies after its publication, these five key elements will be explored in this research.

I. The first key element is the **role of place**, as indicated by Pani-Harreman et al. (2021), the role of place has a double meaning. Firstly, it refers to the physical attributes of a place, such as the suitability

of a person's home, or the neighbourhood they live in (Pani-Harreman et al., 2021). As people grow older, it becomes more likely that they will have one or more disabilities, or handicaps, however, the vast majority of people who experience this do not need to move into a nursing home (Planbureau voor de Leefomgeving, 2019). People who are older than seventy-five often, have at least one physical disability, and even though these disabilities can make them less mobile and possibly more dependent, according to the Dutch Planbureau voor de Leefomgeving (PBL) these people are often better off ageing in place than in a nursing home. Home improvements, as well as (informal) care provided in their own homes are more cost-effective, as well as more pleasant for the older adults than moving into a nursing or retirement home. Not only the personal dwelling is important, but the neighbourhood also plays a significant role. Neighbourhoods that are generally regarded as "safe" greatly reduce the risk of older people feeling out of place, or excluded (Lewis and Buffel, 2020), both of these feelings can have negative consequences for the health of the people experiencing them. According to Buffel and Phillipson (2023), on top of safety, which is a less tangible concept, the availability of adequate transport, as well as open and green spaces are important for making areas suitable for ageing in place. On top of that, on a neighbourhood level, age-friendly crossings and streets, or age-friendly accessibility so to say, also play a significant role (van Dijk et al., 2015). Van Dijk et al. (2015) also mention the availability of facilities nearby as very important.

Secondly, the role of place refers to how people take a liking to the place they live in, as opposed to the physical place itself. The emotional connection one has to a place becomes more important in later life, helping to maintain self-esteem and a sense of security and belonging, even when your physical abilities become less (Aliakbarzadeh Arani et al., 2022). However, just as people change, neighbourhoods change over time, this is something that is often forgotten when talking about ageing in place and can negatively impact resident's sense of belonging (Lager et al., 2013). The emotional attachment to place is very personal, and even though it is a driver of ageing in place, it is not always positive. Sometimes, older adults will keep on living in homes or neighbourhoods that are no longer suitable for them, because they are so attached to the residency and the neighbourhood (Lebrusán and Gómez, 2022). In some cases, emotional attachment to place can be conflicting, for example, due to gentrification or other negative changes in the neighbourhood (Lager et al., 2013; Lewis and Buffel, 2020), in that case, people can become torn between their attachment to the place, as well as the new reality of the place. Whereas familiarity and a clear identity older adults can have to and within a place can also have positive effects, as those can relieve some of the stress that people experience because their overall health starts to deteriorate as they age (Lager et al., 2013). Emotional attachment to place comes from memories, friends and experience and is therefore closely related to the second key element of ageing in place, social networks.

II. Social networks are a key element of ageing in place and can mean anything from friends and family to neighbourhood social cohesion. In the sense of ageing in place, social networks relate heavily to community engagement (Pani-Harreman et al., 2021). As established earlier, for ageing in place it is important that people can remain active within their communities. One important determinant of people wanting to remain active in the community is social cohesion. When people experience a high degree of social cohesion, this positively affects their subjective well-being, which in turn, positively affects their quality of life. Dijk, Cramm and Nieboer (2013), also consider building shared values as an important aspect of social cohesion. In neighbourhoods, that show high levels of social cohesion, as indicated by their residents, residents are more likely to experience things as familiarity with the neighbours, and interpersonal trust, it is also thought that the adverse effects of stress and negative life effects, such as death are better dealt with (Dijk et al., 2013). Remaining active within the community can also help with maintaining an active lifestyle, as well as maintaining independence (Roberts et al., 2017). Lastly, being engaged in a community can boost feelings of self-fulfilment, positively affecting mental health (Boldy et al., 2011; Pani-Harreman et al., 2021).

III. The third key element of ageing in place is **support**. Support is closely related to social networks in the case of ageing in place. Support can be categorized into two categories, formal and informal support. Most of the support that is given in Europe is informal, this support is given by spouses, children or close friends (Costa and Arlotti, 2020). Formal support is given by professionals. Especially for more frail older adults, support is an important aspect of being able to age in place. Support is not only medical care, it is an over-encompassing term for everything ranging from medical care, to accessibility of services, to transportation, even home maintenance (Pani-Harreman et al., 2021). The vast majority of support is informal and is therefore heavily influenced by the social networks older people have. Support is a very important key element of ageing in place, however, it can also be problematic. As individuals age and become more physically frail, their need for increased care becomes more pronounced. This necessity often conflicts with the desire to maintain autonomy, potentially leading to feelings of burden among the elderly in certain circumstances, especially if they receive informal support (Costa and Arlotti, 2020). In cases where informal support older people receive is support for transportation, they can become hesitant to request this support, possibly becoming disconnected from the community in the process.

IV. The fourth key element is **technology**. Technology is also a very broad term that encompasses a broad range of things. Think of mobility technology, such as a chairlift, scoot mobile or even a walking stick. Tech that helps around the house, such as a lawn mower robot. But technology can also be medical such as medicine or an emergency button, or even ICT related, in a Dutch context DigID for example (Pani-Harreman et al., 2021). Technology can also play a role in preventing older adults from

becoming isolated as technology also means communication related tech, think of phones and computers (Ollevier et al., 2020). On top of that, relatively simple technology, such a pedometer wristbands or more complex technology such as sporting equipment, can help older adults maintain a higher level of physical fitness and activity (Ollevier et al., 2020). Lastly, technology can also feature safety measures, for example home security systems or security cameras. Technology is very important in enabling older adults to grow old in the comfort of their own homes.

V. The fifth and final key element of ageing in place is called **personal characteristics**. Personal characteristics consist of the personal preferences, views and ideas of individual people. Grimmer et al. (2015), identified the main personal characteristics that are important for ageing in place, these being adaptability, resilience and independence, in combination with their overall physical and psychological wellbeing. Adaptability refers to changes that people made in their way of living to make sure they maintain independence. Resilience means dealing with the problems that they may encounter because of getting older and lastly, independence, referring to an individual's desire to maintain independence and the will to pursue ageing in place. Furthermore, Grimmer et al. also found that it is important to be both physically and mentally active. Personal characteristics is perhaps the most self-evident key element, however, it is of great importance for achieving ageing in place.

2.2 Collective Housing

2.2.1 The Definition of Collective Housing

Collective housing is sort of an umbrella term, according to Vos and Spoormans (2022), **collective housing refers to forms of living together with multiple households around shared common areas or facilities, combined with the independent living and privacy of each individual household**. Another term that is often used is collaborative housing, whereas the definition of collective housing focuses on the living arrangements around shared common rooms and/or facilities, the definition of collaborative housing focuses more on the mindset and collaboration of the inhabitants (Czischke et al., 2023). However, according to the definition of Vos and Spoormans (2022), collaborative housing can be regarded as a form of collective housing. Aspects of collective housing that are left out of the broad definition that is used now is the communal living aspect and the joint responsibility of the residents.

2.2.2 Collective Housing projects as a place for Ageing

As mentioned earlier in this research, ageing in place has five key-elements that are important to consider. Collective housing, or cohousing for short could in theory positively affect ageing in place.

Collective housing, especially when it is developed specifically for older adults to cohabitate together, whilst maintaining independence can be a very positive experience. In previous studies, it was found that older adults associate the quality of their residential environment with feelings of loneliness and social isolation (Robison et al., 2011), social isolation and loneliness being some of the most common problems that older adults encounter in their day-to-day life, greatly affecting their quality of life. In collective housing projects, there is an emphasis on community (Czischke et al., 2023). As mentioned earlier, the social network of older adults is one of the key elements of ageing in place. As people get older and eventually stop working, they start to spend more time in closer proximity to their residence, which increases the importance of the neighbourhood and direct residential area for these individuals (Dijk, Cramm and Nieboer, 2013). On top of that, older adults can also have a smaller action radius due to decreased mobility because of ageing (Zantinge et al., 2011). Therefore, cohousing projects, which are designed to improve social contacts and interaction, would be a great residency alternative for older adults who want to maintain an active social network in closer proximity to their homes. This is because research shows that older residents of collective housing projects feel more connected to each other, and a higher degree of social participation and community has a positive effect on their happiness and perceived quality of life (Labit, 2015). The aforementioned effects are most strongly observed when the physical design of the project encourages social interaction (Labit, 2015).

Furthermore, it is also thought that cohousing could enable ageing in place for individuals who would not be able to under normal circumstances, as living in a cohousing project could alleviate the stress of things like home maintenance or day-to-day chores (Puplampu et al., 2020). If a cohousing project is built with elderly inhabitants in mind, the homes can be made suitable for ageing in place by making improvements to the homes. The kind of improvements that can be made are minimizing architectural barriers and making the projects accessible for all inhabitants by adding things like elevators or wheelchair ramps. Such improvements can be expensive, therefore the larger scale of a cohousing project could enable the implementation as the costs of the innovations can be split among the inhabitants. Pijpers et al. (2015), found that especially in rural areas, a lot of residents did not think their homes were suitable for ageing in place, the main reason for this was that the homes did not have any special home improvements done for enabling ageing in place. When building a residency, especially for multiple households, making sure the design is universally accessible and inclusive enables people to make use of it for as long as possible. Technology can potentially play a big role in achieving universal design, in France, a “smart” home, focussed fully on enabling cohabitating older adults to age in place is being tested in a living lab setting (Rumeau et al., 2021). The house, called Blagnac smart home, features specialized assistance devices such as automatic lighting, pill boxes, automatic opening doors, as well as sensors measuring ambient parameters for domestic safety in the

house. In addition, the house also features motorized furniture in the common rooms which are adjustable in height, making overall life easier for the inhabitants and enabling them to achieve ageing in place, as well as enabling the residents to keep using the common rooms for socializing with each other (Rumeau et al., 2021). The people living in the Blagnac smart home were all of old age, ranging from 82 years old to 96 years old. Even though the Blagnac smart home is one of the first of its kind, the implementation of technology on such a high level could be a very good idea when designing a cohousing project specifically for older inhabitants, as stated by Rumeau et al. (2021), especially in rural areas. However, implementing such highly specialized and experimental technology would likely work best for smaller projects because the costs associated with implementing such measures would be sizeable. In addition, the inhabitants would also have to be taught how to use the technologies, which would be easier on a small scale. On the other hand very big projects could possibly also work, if more residents can chip in, the costs for these innovations can be spread among more people and the costs would likely amount to a smaller percentage of the total costs. However, greater quantities of the aforementioned innovations would be more expensive. At this time, the best scale for implementing these innovations is difficult to say, as Blagnac smart home is among the first of its kind. In conclusion, technology could play a significant role in enabling people of older ages to maintain independence. In practice however, the costs associated with implementing specialized technology are sizeable making it unlikely that people will add such technologies to their own houses. The larger scale of collective housing projects, makes them particularly interesting as implementation places for technology, especially now that collective housing is rising in popularity among older residents in western Europe (Czischke et al., 2023). The added benefit of the rise in popularity is that new projects will likely be built, making the implementation of technology easier.

Another way of enabling older people to maintain independence and enable ageing in place, is through the implementation of an Integrated Service Area (ISA). An ISA is when the providers of housing and care (both medical and social) work together, to improve services or introduce services such as care-on-demand or support in the form of carers or volunteers, or make these services available within walking distance (400m) (Jansen et al., 2018; Pijpers et al., 2016). An ISA can be especially helpful in rural areas as usually these areas are more remote and services are further away. Introducing cohousing projects for older adults in areas that have an ISA could in theory enable the elderly residents to age in the comfort of their homes, without moving into a long-term care residence or nursing home. Having an ISA has many benefits for the residents, some of the ways that ISAs can help residents are in the personal care department, such as helping residents with personal hygiene if this is necessary, but also things as helping residents with digital banking and things as tax deduction (Pijpers et al., 2016). The possibility of integrating collective housing projects in areas that are in an ISA could thus positively

affect multiple key elements of ageing in place, these being “support”, as well as “technology”. It would also be a good idea to implement these ISA’s in areas where there is a large concentration of people that would benefit specifically from an ISA, ergo a concentration of older people.

On a smaller scale, it would also be possible for the collective housing projects themselves to work together with care professionals. This form of integrated care, or on-site care is not unheard of. For example, Dutch elderly care organisations Actiz and Aedes offer care to collective housing projects where care-needing elderly the option to move into collective housing projects that could be classified as semi-assisted living, these projects are operated by different organisations. The residents live autonomously, in communities but care is always nearby when needed (Actiz and De Wee, 2021). One of these projects, called Zonnetij Aarle Rixtel, offers 98 appartements, and care is available 24 hours a day. Actiz also works together with smaller scale citizen initiatives, one of these projects is called “de Borgstee” and is located in Vledder, this project offers 16 appartements with permanent residents and 16 appartements for that are available for rent. According to Actiz, the care professionals only take responsibility for the high-level (or complex) care, the easier care responsibilities are taken up by the residents.

Another means of making ageing in place possible for older adults, is by implementing passive monitoring systems in their homes, such as a fall detection monitoring system. Fall detection monitoring systems have been around for years, at first as wearable devices that required the press of a button when someone fell but nowadays these systems also exist as ambient recording devices, monitoring the air, vibrations pressure or even acoustics of a space (Vallabh and Malekian, 2018). Camera-operated systems also exist, however, these can be considered to be more intrusive to the users. Implementation of such monitoring systems for detecting falls could assist older adults with ageing in place, however, these sorts of monitoring systems are not exclusive to cohousing and could also be implemented in one’s own residential home. The benefits of having these monitoring systems installed within a collective housing project are relatively straightforward. Firstly, the costs associated with installing these ambient monitoring systems are relatively high and can be shared amongst the inhabitants. Second, if more older people reside in the cohousing project, their safety can be greatly improved, not just in their own homes but also in a larger part of their daily activity space. The drawbacks of course, would be the associated costs which could be shared among inhabitants in a collective housing project. Another drawback is that these monitoring systems can be considered intrusive. Implementation of such systems would positively affect the key-element of “technology”. Other ambient health monitoring systems are mostly wearable technologies, although it would be beneficial if older adults make use of these technologies as they age, collective housing has no effect on these technologies.

As mentioned earlier, perceived safety (on a neighbourhood level) is very important in making places suitable for ageing in place. As collective housing projects are often designed with the goal of creating a community in mind (Czischke et al., 2023), residents of these projects report strong feelings of cohesion, as well as a high degree of perceived safety (Ruiu, 2015). On top of that, since the residents of these projects usually make joint decisions with each other, the risk of older inhabitants feeling excluded or isolated is kept to a minimum, even in projects that are not specifically catered towards older adults. High levels of social cohesion also have a positive effect on the health of older inhabitants, this is because in strong communities, older adults are less likely to become lonely or socially isolated (Miller et al., 2020). In addition, in practice, residents of cohousing projects are usually quite similar to each other and when new potential residents are keen on joining, the current residents will have a say in whether or not they can join the project. According to Williams (2005), having a homogeneous community reinforces social interaction which should further decrease the chances of older inhabitants feeling excluded or isolated within the projects. Even when the project is started from scratch, future inhabitants are often already in close contact with each other before and during the building process, further improving social cohesion among the residents (van den Berg et al., 2021). Collective housing thus has a very positive impact on the social networks of its residents, which is one of the key elements of ageing in place. High amounts of social interaction and perceived social cohesion can also have a positive impact on the key element "support" as it was found that residents of cohousing projects also gave each other various forms of informal care, ranging from driving one another to the hospital when needed to prepare meals for one another as well as social and emotional support (Puplampu et al., 2020; Van Den Berg et al., 2023).

Cohousing projects almost always feature shared spaces, such as gardens or other communal areas, there is an even further increased chance for social interaction among residents. It is stated by Williams (2005) that when people live in close proximity to each other and are given adequate space for interaction, there is likely to be an increase in social interaction. The residents of cohousing projects usually share the responsibility of maintaining the shared spaces together, according to Sandstedt and Westin (2015), residents do not mind these responsibilities, mentioning that it strengthens a sense of belonging and purpose among residents. On top of that, it was found that when people spent more time in places where they have a lot of social interaction, they started to become more attached to the place (Kearns et al., 2012). Next to public spaces, semi-private spaces are also very important. Williams (2005) noted that people can start to feel burned out by, or overly exposed to the community if the transition between public and private spaces is not properly executed. A way to counteract this is by introducing semi-private spaces, such as terraces or porches. Williams (2005) noted that in a cohousing project where these semi-private spaces were initially not available, the residents even started to

create their own semi-private spaces. Thus from the literature, it can be stated that collective housing positively impacts the social networks of its residents, which could in turn, also positively affect the key element of support.

2.2.3 The importance of personal characteristics for ageing in place

The last key element that has not been highlighted thus far is personal characteristics. Personal characteristics refer to the Resilience, Adaptability and Independence of older adults, in combination with their mental and physical health and this influences their preferences and abilities regarding ageing in place (Pani-Harreman et al., 2021). Collective housing can have positive effects on the social networks, and support of older adults and, through design, also positively affect other key-elements like technology and the role of place. It is likely that personal characteristics (independence, resilience and adaptability) of an individual can influence the way they experience the other four key elements. Perhaps the most important personal characteristic for ageing in place is independence, when people are independent, they are more likely to be able to achieve ageing in place. Independence for older adults is very connected to their physical health, especially their cardiorespiratory health and muscle strength (Paterson et al., 2004). Therefore, in order to maintain independence and enable ageing in place, it is advised that older adults maintain an active lifestyle for as long as they can. Maintaining an active lifestyle, also known as active ageing, can be promoted through the design of places (Sturge et al., 2023). Inclusive design, also known as universal design, can not only positively affect active ageing, but also play an important role in reducing (social) isolation among older adults (Sturge et al., 2023). By making sure that places are designed inclusively, older adults are able to keep moving around independently, not needing support for transportation, thus maintaining independence in mobility, and making it possible to maintain an active lifestyle. Independence is thus important for older adults wanting to achieve ageing in place and it can be enhanced through inclusive design. As mentioned earlier, collective housing projects often have common rooms or shared gardens, these areas can be designed inclusively, promoting social interaction.

Next to independence, resilience and adaptability make up personal characteristics important for ageing in place (Grimmer et al., 2015; Pani-Harreman et al., 2021). Both resilience and adaptability are important for older people to maintain independence. Both can be influenced by collective housing. As mentioned earlier, collective housing has a high focus on community, having a strong community can help people deal with problems they could encounter such as the loss of a loved one or other life events, but also help in day-to-day tasks and chores (Dijk et al., 2013; Puplampu et al., 2020). A strong, tight-knit community is not uncommon among residents in collective housing projects. However, it is difficult to say if this is because of the project they live in. It could be, that collective housing attracts more socially inclined people (Van Den Berg et al., 2023). Nonetheless, strong communities can be very

beneficial and social cohesion is even regarded as a critical social determinant of health (Miller et al., 2020). Strong communities and high levels of social cohesion also have another benefit, in addition to having a positive effect on the mental health of residents, a strong sense of belonging is also positively related to higher levels of leisure time physical activity (Kim et al., 2020).

In conclusion, collective housing can positively affect its residents, however, it is hard to say whether collective housing attracts more socially oriented people or if the people opting to reside in collective housing projects become more social within the communities they become a part of. It is likely that the relationship works both ways and that likely already socially oriented people are given every opportunity to be social amplifies can both influence and are influenced by the effects of collective housing.

2.3 Conceptual Model and hypotheses

2.3.1 Conceptual model

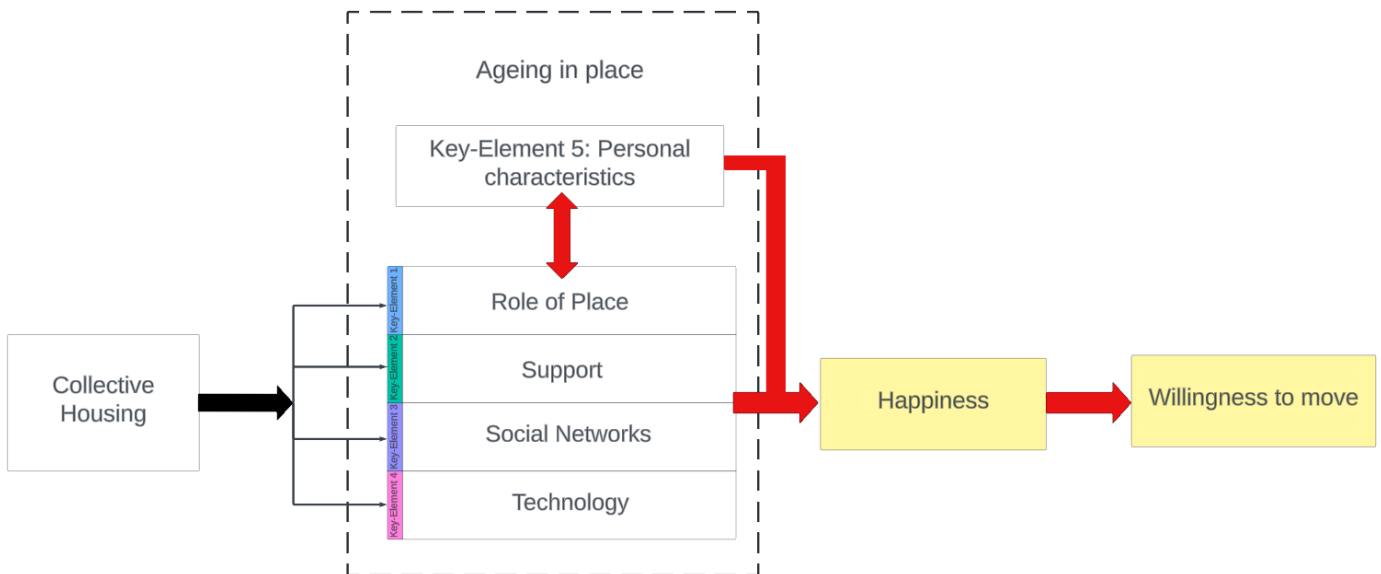


Figure 2: Conceptual Model. The red arrows indicate the relations that are researched. The yellow squares will be used as dependent variables for sub-questions three and four. Ageing in place is made up out of the five key-elements (hence the dotted line).

In the conceptual model, the intention of this research is displayed. The research looks at the five key-elements of ageing in place and how these are experienced by people living in collective housing projects, there is no test population of people that are not living in collective housing projects.

The double sided red arrow between personal characteristics and the other four key-elements indicates sub-question two where the effect of personal characteristics on the other key-elements is researched. It is suspected that personal characteristics are not necessarily influenced by collective housing.

The red arrow from the five key-elements to happiness represents sub-question three. In this sub-question the effects of the five key-elements of ageing in place on happiness is investigated. By gaining knowledge about the effects of the five key-elements of ageing in place on happiness something can be said about their importance, as happiness is, as mentioned earlier, associated with greater life-satisfaction and quality of life (Prati, 2022).

The last red arrow represents sub-question four. Here the relationship between happiness (also the key-elements of ageing in place) and willingness to move is investigated.

2.3.2 Hypotheses

This research has to following hypotheses:

The main research question:

Main hypothesis: It is hypothesized that the key-elements of ageing in place will be well-represented in collective housing and will receive high scores from residents. The key-elements are expected to have a significant, positive effect on happiness and therefore collective housing will positively influence happiness for the residents.

The sub-questions:

H1: the five key-elements of ageing in place will have a positive effect on happiness.

H2: Residents who gave higher scores to the questions relating to personal characteristics will also give higher scores on the questions about the other key-elements.

H3: When residents report that the key-elements of ageing in place are not well-represented, these residents will be more willing to move away from the projects they live in.

3. Methodology

3.1. Research Design

This research makes use of two main methods, a literature review and quantitative research through means of a questionnaire. This research is exploratory in nature, using happiness as an outcome variable in order to uncover the importance of the five key-elements of ageing in place, which are taken directly from literature in a Dutch context. In order to answer the first sub-question and to lay the basis for answering sub question two, a literature review has been conducted, the literature also served as the basis for designing the questionnaire that was in turn used for statistical analysis to answer sub-questions 2 through four (Figure 3). Quantitative research, rather than qualitative research was chosen because this research aims to find out which of the key-elements of ageing in place are well-represented in collective housing and their respective effects on resident's happiness. When the effects of the key-elements are better understood, and the importance, or unimportance of them is researched, the results can be applied to a multitude of different collective housing projects. Quantitative research makes it possible to reach a bigger population and include more cases than qualitative research.

Measuring the key-elements of ageing in place for residents of collective housing projects gives an idea on how the key-elements are represented in collective housing projects. By then comparing the results to resident's happiness, something can be said about the importance of the key-elements for ageing in place in collective housing.

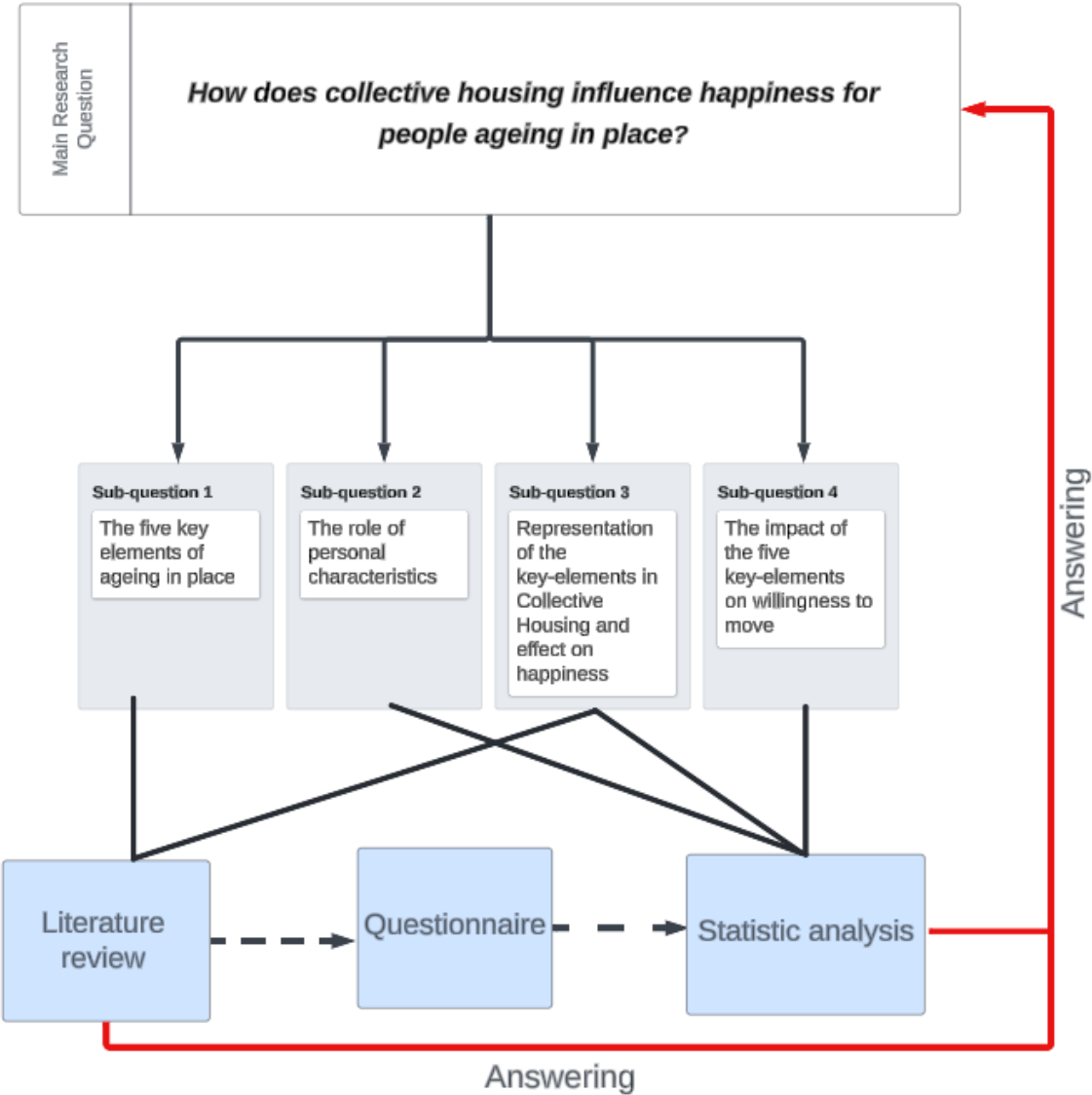


Figure 3: Overview of research techniques and answering of the research question.

3.1.2 Output

In order to visualize the results of this research, the goal is to create an overview that is inspired by the “Adaptive Capacity Wheel”, which was developed in a study done by Gupta *et al.* (2010). The original adaptive capacity wheel was developed to test and visualize adaptive capacity on the basis of six categories, each consisting of three to five sub-categories (Gupta et al., 2010). All of the different categories receive a score and a corresponding colour, red indicating negative, green and dark green indicating positive (high) scores.

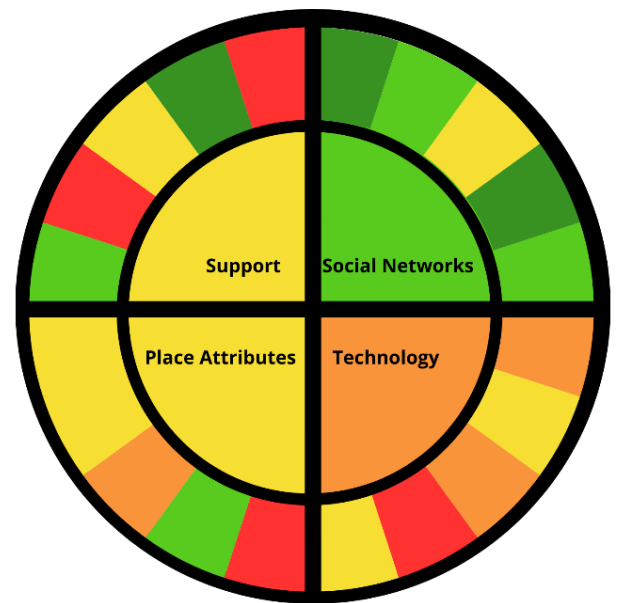


Figure 4: Example of research output: Experiences of ageing in place in collective housing

Although the output of this research is based (visually) on the adaptive capacity wheel, the way of studying the results and scoring the attributes is different (Figure 4). The colours in the wheel come from respondent’s answers in the questionnaire. The questionnaire is designed to have all the different statements scored on the same five-point Likert scale. A 1 indicating wholeheartedly disagree, a 2 indicates disagree, 3 is a neutral answer, 4 means agree and 5 indicates wholeheartedly agree. This then enables the researcher to attribute a score to each of the key-elements, by taking the mean of all the answers. Five would be the highest attainable score, one the lowest. These scores will be translated to a colour and the expected output will look something like Figure 4. The benefits of the output is a model that is very easy to read and understand, immediately granting an overview of how the five key-elements of collective housing are experienced by residents of collective housing projects. If the data allows it, the results can then be analysed for different age-groups or genders, or people that score lower or higher on the “happiness” part of the questionnaire.

3.1.3 Literature review

The basis for this research is the literature review (chapter 2). The literature review consists of two main parts and the conceptual model, the first part is about ageing in place and the five key-elements that are important in achieving ageing in place, this is based on the study done by Pani-Harreman (2021) as explained in chapter 2 as well. In order to go more in-depth on the five key-elements, additional research into the key-elements was conducted in order to achieve a better understanding of the five topics. This was done by collecting additional literature found by searching for the key-element, in combination with search terms like “ageing in place”, “collective housing”, “cohousing”, “Europe” or “Netherlands”. Firstly abstracts were checked in order to make sure the context that was used in the literature was relevant for this research. If the abstract was promising, papers were scanned and when deemed relevant, read and used as sources. Papers were deemed relevant if the context was similar to collective housing or if the research was deemed to be applicable in Dutch collective housing.

In the second part of the literature review, collective housing as a potential place for ageing in place is discussed. Suitable papers to use in this part were found by adding terms such as “collective housing” or “cohousing” to the terms used to find the papers for the other key-elements, terms as “personal characteristics”, “technology”, “support” and “social cohesion” etc. The databases that were used to find literature were Google Scholar (via RUG proxy) and the Smartcat database provided by the University of Groningen. In order to find more relevant sources, the snowballing method, also known as citation chaining was used. In short, this method uses sources from initially found papers in order to gain a deeper understanding of the subject. Sometimes, reoccurring concepts from these papers, or different were used to find additional literature. For example, technology evolved into more specialized forms of technology, such as “fall-detection systems” or “passive health monitoring” in order to come to more specialized papers in the field. Lastly, whenever possible, more recent papers were preferred over older papers, some exceptions were made for papers with lots of citations (according to Google Scholar). Only academic articles were selected.

3.2 Data

3.2.1 Data Collection and questionnaire design

For this research, data collection was done by means of a questionnaire, the questionnaire was designed by the researcher on the basis of the theoretical framework and existing questionnaires. The final questionnaire contained three parts, the control questions, the five key-elements of ageing in place and lastly the short-form Oxford happiness questionnaire (Hills and Argyle, 2002, p. 1079).

Because of the nature of this research and the aim of providing an insight into Dutch collective housing, data was collected from current residents of Dutch collective housing projects. On top of that, to make

sure the questionnaire was only filled in by current residents of collective housing projects, the questionnaire also featured control questions to make sure that people who do not reside in cohousing projects do not fill out the questionnaire.

In order to gain an insight into ageing in place in Dutch collective housing projects, this research looks at how residents of collective housing projects experience the, according to the literature, key-elements of ageing in place (as defined by Pani-Harreman et al. (2021)), in order to gain an insight into the suitability of collective housing projects for ageing in place. In order to measure the impact of the key-elements of ageing in place, the results will be measured against the happiness of the questioned residents by means of the earlier mentioned Oxford happiness questionnaire, as happiness is associated with better health and greater life satisfaction (Gundelach and Kreiner, 2004; Steptoe, 2019).

The questionnaire was designed with the following goals in mind: the questionnaire had to be short, easily understood and, wherever possible, all questions had to be answerable in the same way, a five-point Likert scale. A five-point Likert scale enables respondents to choose a neutral answering possibility. The five-point Likert Scale also fits the proposed model: by giving the respondents five answering possibilities, the means can easily be calculated for the different key-elements and can easily be visualized into a model as it is shown in figure 4.

In the questionnaire, the five key-elements of ageing in place had to be represented but the questionnaire also needed to be short. Therefore it was chosen to include five statements per key-element. The statements were inspired by the theoretical framework. For example, the key-element role of place is about the physical attributes of a place but also about the feelings associated with a place, such as feeling at home or in place. From this, the following statements were designed: “my home is completely suited to grow very old in”, to refer to the physical attributes. But also statements like “I feel safe in and around my house” or “I completely feel like I belong here”. This method of designing statements was used for all five of the key-elements and is explained in more detail in Appendix 1.

The last part of the questionnaire, the short-form Oxford happiness survey has to be answered on a six-point scale, removing the neutral possibility and effectively forcing the respondents to choose. The six-point scale is the original intention of usage from authors Hills and Argyle and the questionnaire was field-tested in this form. From these tests it became clear that the short-form questionnaire yielded similar results to the extended, full-size questionnaire (Hills and Argyle, 2002). Because the short-form Oxford Happiness questionnaire was field tested with six answering possibilities, the answering method was not changed to a five-point scale in order to make all the questions answerable in the same way.

An overview of the questionnaire can be found in Appendix 1. Some of the questions in the final version of the questionnaire were taken from existing surveys about the following topics: Neighbourhood social cohesion (Buckner, 1988) and Personal resilience (Jefferies et al., 2022) (Appendix 1). The reasons that these two existing questionnaires were selected are as follows: The neighbourhood social cohesion measurement tool by Buckner (1988) is a survey that was also used in similar research in a Dutch context (Van Den Berg et al., 2023). The personal resilience questionnaire by Jefferies (2022) was used because it is a short-form questionnaire. The reasoning behind using questions from a short-form questionnaire was that the questions would also be useable in isolation rather than if the questions were chosen from a very long questionnaire where the questions could possibly be more interrelated.

However, the vast majority of the questions were designed by the researcher on the basis of the theoretical framework and were about topics where collective housing specifically could have benefits over conventional housing, such as expensive health monitoring systems or common areas. Appendix 1 it is made clear what questions are taken from existing questionnaires.

In order to reach potential respondents, contact was made with collective housing corporations, organisations, and specific individual collective housing projects. In addition, the survey was also shared on LinkedIn, by the researcher himself, but also by others that have a bigger and more relevant network. Lastly, the survey was also shared in two Facebook groups that were deemed relevant by the researcher. In order to make sure the survey was only filled in by the relevant population, the survey is pretexted with requirements for the respondents and features multiple control questions as can be seen in Appendix 1. A full list of contacted corporations, organisations, Facebook groups and individual projects can be found in Appendix 2, as well as the standard message that was sent to all potential respondents or corporations as initial contact. Next to contact through mail, phone calls were also made, these calls were not recorded.

3.2.2 Data analysis

In Order to come to results, the collected data has to be analysed. The main method of analysis will be statistical analysis done in SPSS 26, by IBM statistics. In order to answer the second sub-question and produce the model as shown in Figure 4, the aforementioned method will be used on the basis of the collected means for all questions of the questionnaire. After that, a multiple linear regression will be done to determine whether the key-elements of ageing in place are correlated with the scores for overall happiness in a statistically significant way, this then provides an insight into their importance according to the respondents.

The data can be sub-divided into three groups, control variables, independent variables (predictors) and dependent variables. The variables can be explained as follows:

Control variables: The control variables in this research are questions one through six (Appendix 1). These variables are: age, sex, marital status, working status, living situation and financial situation. The control variables are a set of common control variables that are often used in studies interested in happiness, quality of life and life satisfaction (Glass, 2020; Gundelach and Kreiner, 2004; Prati, 2022; Stevanovic, 2011).

Independent variables: The independent variables of this research that will be used to conduct the multiple linear regression analysis are separated into the five key-elements of ageing in place, these being: Attributes of place, Support, Technology, Social networks and Personal characteristics. More information about these questions can be found in Appendix 1.

Dependent variables: This research has two dependent variables. The first one is happiness, as measured through the short-form Oxford happiness questionnaire. The second one is willingness to move (Attributes of place, Q6). By measuring the willingness to move, something can be said about the importance of the key-elements of ageing in place in resident's decisions to remain living in the collective housing projects in old age. This variable was recoded to reverse the scores as the question was worded negatively.

3.2.3 Sample

The data that was collected from the survey was not evenly distributed, in total the survey had more than 120 responses, of these responses 87 people filled in all of the required questions. As a result of this, 87 cases were used for the statistical analysis. There were some respondents that had missing values and other respondents were younger than the required age of 55. The sex and age of the respondents is displayed in figure 5 and figure 6. The sample consists of more female respondents than male respondents and most of the respondents were between the age of 65 and 75. At this point it must also be pointed out that respondents had the option to fill in "other" or "prefer not to say" at the question about gender, however, none of the respondents chose these options. The quality of the sample was deemed good enough for this exploratory research by the researcher, although, if a follow-up study would be done, a greater sample size that is better distributed could likely have benefits.

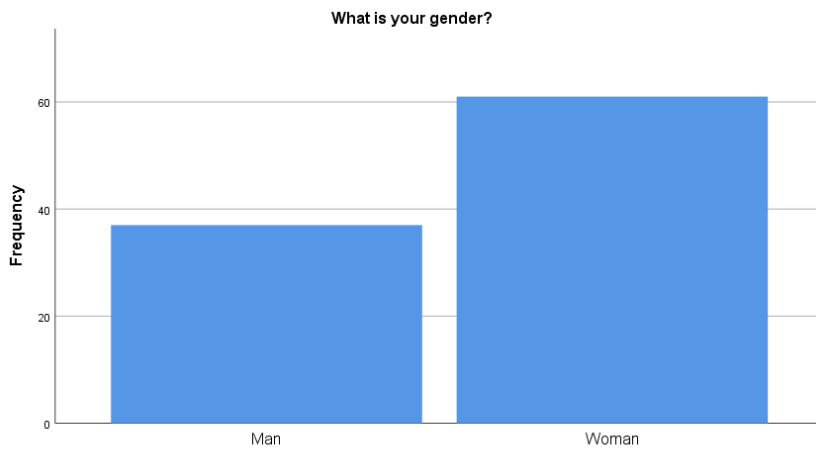


Figure 5: Sex of respondents (frequency) (Made in SPSS26 by IBM Statistics, translated)

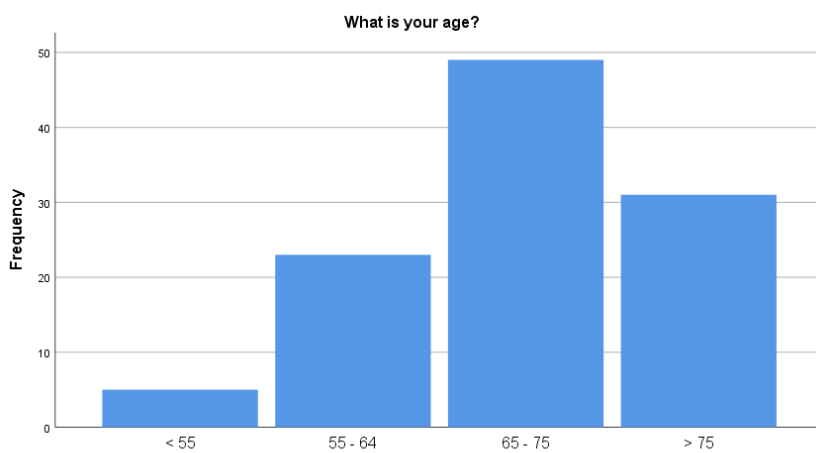


Figure 6: Age of the respondents (frequency) (Made in SPSS26 by IBM Statistics, translated)

3.2.4 Descriptives

N = 87

Variable	Mean	Std. Dev,	Min	Max
Role of Place	4.061	0.876	1.00	5.00
Technology	3.114	0.748	1.80	4.80
Social Networks	3.805	0.740	1.60	4.80

Support (improved Cronbach's alpha)	3.958	0.576	1.67	5.00
Personal Characteristics	4.039	0.519	2.40	5.00
Oxford Happiness (dependent)	4.832	0.587	3.00	5.13

Table 1: Descriptive statistics

In table 1, the descriptive statistics for the means of the five key-elements, as well as the mean for happiness is displayed. Firstly it should be mentioned that the five key-elements were scored on a five point scale whereas happiness was scored on a six point scale. For the five key-elements of ageing in place, respondents were asked to indicate what they thought of the statements in the survey on a five point scale, meaning that 3 indicates a neutral response. From the means it can be said that the respondents were most positive about the key-element role of place and least positive about the key-element technology. The mean for happiness was 4.832, which is relatively high, indicating that the sample of respondents can be considered relatively happy.

3.2.5 Data transformation and requirements

In order to prepare the dataset for multiple linear regression, some new variables had to be computed. In the regression, latent variables will be used. For example, the eight-questions, Oxford Happiness questionnaire will be made into one latent variable (MeanOxfHapp) consisting of eight variables. The same was done for the five key-elements of ageing in place. Some of the questions in the survey were worded negatively, these had to be recoded to reverse the scoring. All of the Syntax code relating to recoding variable scores, as well as computing latent variables can be found in Appendix 3.

In order to check the quality of the questionnaire that was produced, the internal validity of the questions per category was checked by calculating Cronbach's Alpha. When filling out a questionnaire, it is expected that questions relate to each other per category. A higher score on one question means that other questions in the same category are also expected to have a higher score. Cronbach's Alpha values were interpreted according to Taber (2018), the alpha score for "support" was not satisfactory. The syntax code and output can be found in Appendix 4.

Key-Element	Cronbach's Alpha
Place Attributes	.897
Support	.381 (after troubleshooting .645)

Technology	.663
Social Networks	.811
Personal Characteristics	.780

Table 2: The Cronbach's alpha values for the key-elements of ageing in place

After troubleshooting, it was determined that there were two questions causing problems. Both questions were about professional care. After consideration, these two questions were excluded in the mean calculated for Support, used in the multiple regression analysis to prevent issues. According to (Pallant, 2020), A Cronbach's Alpha value of above .600 is acceptable for exploratory research, although an alpha of .700+ is preferred. The output can be found in Appendix 4.

In order to use the control variables, dummy variables had to be created, as the control questions used categorical answers. Dummy variables were thus created for each control question, the syntax for this can be found in Appendix 4 as well.

3.2.6 Assumption testing

The preferred method of statistical analysis for this research is multiple linear regression. In order to run a multiple linear regression, there are several assumptions that need to be tested in order for the results of the regression to be viable (Pallant, 2020). This assumption testing was done for the expanded models and is discussed in the respective chapters.

3.2.7 Ethical considerations

In order to guarantee the safety of the data that was collected, as well as to make sure that the research data is handled responsibly, the GDPR rules were followed. The questionnaire featured minimal personal questions and was fully anonymous. Respondents were not asked for any personal information except their age. In order to further guarantee anonymity, questions that could contain sensitive information, such as financial information or occupational status were made to be answered in categories.

Participants were informed of this and they could stop participating in the questionnaire at any time without consequences. In order to further guarantee safety of the data, only software that was recommended by the University of Groningen, such as Qualtrics was used. The data, although it is not expected to attract unwanted malicious intentions from others was stored on the researchers personal computer, which is always requires a password to use, as well as backed-up on Google Drive using a university of Groningen account as in line with the data protection guide for student research 2023-2024. Lastly, the raw unedited dataset that was collected will not be shared with anyone except for the

thesis supervisors. However, respondents were given the option to request a copy of the final thesis by sending a request to the researcher.

4. Results

4.1 How are the key elements of ageing in place experienced by people living in collective housing?

In order to answer sub-question two: **How are the key elements of ageing in place experienced by people living in collective housing?** Figure 7. Has been created in order to visualize how residents of collective housing projects experience four of the five key-elements of ageing in place as defined by Pani-Harreman et al. (2021). Personal characteristics is not included in the model as the statements relating to personal characteristics are not necessarily influenced by collective housing. The statements regarding personal characteristics were about an individual’s health, resilience and adaptability as defined by (Pani-Harreman et al., 2021; Paterson et al., 2004). The intended use for the statements regarding personal characteristics is to study potential interaction between personal characteristics and the other key-elements of ageing in place.

The numbers in the model are the calculated means for all of the respondents. In the calculation of the mean, the scores for negatively worded questions is reversed. The score in the model is not reversed for clarity. The maximum score that could be obtained per question was five, the minimum score was one. A five can be interpreted as “wholeheartedly agree” and a one can be interpreted as “wholeheartedly disagree”. The model is centred about the number three, which relates to “neutral”. < 3 or the colour red can be interpreted as disagreement meaning that the average respondent did not agree with the statement. Orange means that the average respondent was very close to neutral, yellow means that the average respondent predominantly agrees with the statement, although not fully agreeing. Lastly green means that the average respondent agrees with the statement.

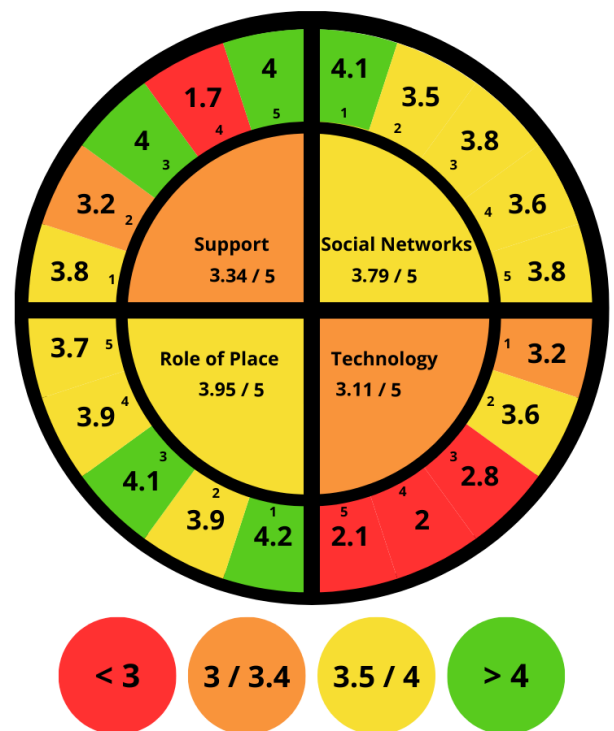


Figure 7: How do residents of collective housing projects experience the key-elements of ageing in place?

4.1.1 Technology

The respondents gave the lowest average scores to key-element technology. The five statements regarding technology were as follows:

1. This cohousing project is fully accessible for every resident, including those with physical disabilities (such as individuals with reduced mobility or those in a wheelchair). (3.2)
2. This cohousing project offers sufficient facilities to call for assistance in case of an emergency. (3.6)
3. This cohousing project makes my life easier through the use of technology. (2.8)
4. This cohousing project is suitable for people with reduced cognitive functions (for example, dementia). (1.7)
5. Some technologies used within this cohousing project infringe on my privacy. (R) (2.1)

Especially statement four obtained a low score. People that have dementia, especially in the latter stages typically do not live at home. This question, which was aimed at looking at the possibility of inclusive design in collective housing projects could be too specific for the sample that was reached by this survey. In hindsight, a question about automated furniture which was used in Blagnac smart home (Rumeau et al., 2021), or other specified usage of technology would have been better. However, according to Alzheimer Nederland, a lot of people that are experiencing Alzheimer's disease in the Netherlands, especially in the earlier stages prefer to remain living at home (Alzheimer Nederland, nd). People experiencing Alzheimer's disease do need specialized care and it is likely that this need for care cannot be properly suited in the average collective housing project. Statement five also gained a low average score, however, this statement is negatively worded. This statement was aimed at uncovering the possibility of monitoring systems, such as fall detection systems or excessive use of cameras. The score being so low likely points at the absence of such systems in the majority of cases. This too is not unexpected as one would expect these systems to be present in specialized care homes as opposed to the average cohousing project.

Statement two had mostly positive scores with the two agreeing categories gathering 54 responses in total, the neutral category got 30 responses.

In conclusion, the key-element technology is not extremely positively experienced by the respondents of this survey and therefore there is much room for improvement. This becomes especially clear when looking at the third statement, this statement, which can be interpreted in a lot of ways and does not particularly aim at care-related technology got 42 responses for "neutral" and 21 for "disagree" meaning that technology still has a lot of unfulfilled potential.

4.1.2 Support

Support got the second-lowest score of the four key-elements. However, informal support got relatively high scores whereas the statements about formal support mostly negatively influence the mean score for this key-element.

The statements relating to support were as follows:

1. I regularly help out my neighbours (this can include anything from small tasks to caregiving). (3.8)
2. Within this project, professional care is easy to arrange. (3.2)
3. I believe that my neighbours will help me if I need assistance. (4)
4. In my day-to-day life, I receive care from a professional. (1.7)
5. If my neighbours need my help, I immediately come to their aid. (4)

The lowest average score was given to statement 4, meaning that most of the respondents of this survey did not receive professional care in their day-to-day lives. As explained in the theoretical framework of this research, the key-element support should be about both informal support and formal support. This inclusion of formal support, or care from a professional was thus deemed important. It could well be the case that in a larger sample, there would be more people that require and receive care from a professional in their personal life. It would seem that in this sample, professional care is not a very high priority. When looking at the individual results, a total of 11 people indicated “agree” and “wholeheartedly agree” on the statement regarding them receiving professional care in their day-to-day lives, whereas 79 people checked “wholeheartedly disagree” and “disagree”. All of the answers for the different questions can be found in figure 8. These scores help to explain the second-lowest score in this category, statement 2. In this sample it would seem that a lot of people do not need professional care, it is easy to imagine that arranging professional care is not a priority. The most checked box for this question was “neutral” with 38 responses, “agree” got the second-most with 30 responses. Both “wholeheartedly disagree” and “wholeheartedly agree” got about the same amount of responses (6 and 9 respectively). There were 16 responses for “disagree”. Therefore the lower scores for these statements could be attributed to the sampling. The questions that relate to informal support all got relatively high scores, this is in line with the expectations according to the literature. It is good to note that people were more positive about their neighbours looking out for them, than the other way around.

In conclusion, informal support is positively experienced in this sample of collective housing projects whereas formal support still has a lot of room for improvement. It is important to note that the projects that were approached for this survey were not specialized projects for older adults and were also not affiliated with care institutions, if this survey was sent out to these institutions, results would likely be very different. There is a chance that some respondents did reside in a collective housing project

specializing in older adults or resided in collective housing projects with extra attention for elderly care, however, the chances are small as most of the approached housing corporations and projects were open projects for all ages that did not specialize in care. It should be noted that Support would be very positively rated if only informal support was measured.

4.1.3 Social Networks

Social networks mostly got scores closer to “agree” than “neutral”, meaning that this key-element is experienced more positively than the previous two. The statements relating to social networks were as follows:

1. I often speak to my neighbours. (4.1)
2. This collective housing project has a close-knit community. (3.5)
3. I often make use of the common rooms of this collective housing project. (3.8)
4. I borrow things from and exchange favours with my neighbours. (3.6)
5. I regularly do things together with my neighbours. (3.8)

After reading the literature, one score that stands out in this category is the relatively low score given to statement two. From the literature review, it became apparent that that one thing that collective housing projects are known for is their strong communities (Czischke et al., 2023; Pupilampu et al., 2020; van den Berg et al., 2021). When looking at responses for this statement, both agreeing answers collectively have 60 responses, 45 indicating “agree”, whereas both disagreeing options have 19 responses combined. From this it seems that an overwhelming majority does think that their cohousing project has a strong community. Still, the neutral category had 18 responses, bringing the average to 3.5. The majority of respondents does think their project has a tight-knit community, yet only 15 of 60 respondents chose the option for “wholeheartedly agree”. Perhaps the results would be different if the question was worded differently or scored on a different scale, a decision that was decided against because it was opted to have every question be answered on the same scale. It is possible that for this question, wording like “Please indicate how closely-knit the community in your housing project is.”. The other statements all scored relatively high, as was expected. The highest score was attributed to statement 1: I often speak to my neighbours. From research done by the CBS, it became clear that older adults (>65 years old) across the Netherlands speak to their neighbours often, 69% of Dutch elderly speak to their neighbours at least once a week (CBS, 2023), making this result, especially in collective housing projects unsurprising.

In conclusion, it can be concluded that that the majority of respondents predominantly agrees with most of the statements relating to social networks. The average could potentially have been higher if

the statement about sense of community was asked differently. Nevertheless, there are still a lot of responses in the “neutral” option for most statements, therefore it could be debated how strong the social networks in the approached collective housing projects are.

4.1.4 Role of place

Lastly, the key-element that gained the highest average score of the four key-elements that were thought to possibly be affected by collective housing, is place attributes, amassing an average of 3.95. The statements relating to place attributes are:

1. I feel safe in and around my home. (4.2)
2. In this project, I have a say about matters that influence my day-to-day life. (3.9)
3. Overall, I find it pleasant to live here. (4.1)
4. I completely feel like I belong here. (3.9)
5. My house is completely suited to grow very old in. (3.7)

According to the literature, safety, having a say in day-to-day matters and a sense of belonging are all very important aspects of ageing in place (Buffel and Phillipson, 2023; Lager et al., 2013; Lewis and Buffel, 2020; Ruiu, 2015). As mentioned in the literary framework, role of place is about the physical attributes of a space, as well as the emotional feeling connected to a place. The first statement, regarding safety, can be seen as a little bit of both, as safety is a feeling as well as something that is measurable. The other statement regarding the physical attributes of a place, statement five scored the lowest average points. Once again, this could be attributed to the sample, as the collective housing projects approached were not specifically catered towards older inhabitants. For all of the five statements, both agreeing answering options were the most popular, by a sizeable lead even over the neutral option. In this category, there was also a sixth statement: *Given the opportunity, I would like to move out of this project*. This statement was not included in calculating the mean for role of place and is also not part of the model, therefore it is also not a part of the five statements mentioned above. This statement that was added for the statistical analysis of this research was answered with an overwhelming majority of respondents choosing “wholeheartedly disagree” (48) as well as only 14 people choosing one of the two agreeing options.

In conclusion, the role of place, especially the feelings connected to the place of residents gained very high scores from the respondents. These results give an insight into the suitability of collective housing projects for ageing people.

4.2 The effects of personal characteristics on the other key-elements of ageing in place

One of the hypotheses of this research was that people who gave higher scores to the statements regarding personal characteristics, would also give higher scores to the other key-elements of ageing in place. This is because personal characteristics consider a person's resilience, adaptability and independence, in combination with their mental and physical well-being (Grimmer et al., 2015). Independence and physical health are important for ageing in place. In the questionnaire, the statements relating to personal characteristics were as follows:

1. I live an active lifestyle
2. I believe in myself
3. Even when I encounter obstacles, I remain hopeful for the future
4. I can adapt to challenging situations
5. I could use more help in my day-to-day life **(R)**

When calculating the mean for personal characteristics, which is used in the statistical analysis, the scoring for question five was reversed, as a higher score on this question would mean people were less independent. In the theoretical framework it was explained that an individual's personal characteristics could potentially have an effect on the other key-elements of ageing in place. In order to test this hypothesis a bivariate correlation analysis was done between all the mean values of the key-elements of ageing in place. the results of this correlation analysis are displayed in table 3.

Key Elements	Role of Place	Technology	Social Networks	Support	Personal Characteristics
Role of place	-	.413***	.635***	.582***	.544***
Technology	.413***	-	.315***	.161	.171
Social Networks	.635***	.315***	-	.632***	.372***
Support	.582***	.161	.632***	-	.568***
Personal Characteristics	.544***	.171	.372***	.568***	-
***p<.001					

Table 3: Correlations table for all five of the key-elements

From the correlation analysis, it becomes clear that there is significant correlation between all of the five key-elements of ageing in place, except the key-element technology. According to Pallant (2020), two correlating variables should not be added into the same regression if they have a correlation score higher than 0.7, this is not the case for any of the five key-elements. Even though there is a lot of correlation between the different key-elements, this did reflect badly in the VIF-values that were calculated in SPSS when these variables were used in a multiple linear regression model including all collected control variables (all VIF-values were significantly lower than the threshold of 10 which

indicates a significant multicollinearity problem (Pallant, 2020)). The VIF-values for all of the key-characteristics of ageing in place were between 1.611 (technology) and 2.471 (social networks).

From the correlations table however, it becomes clear that personal characteristics does affect the other key-elements of ageing in place in a significant way. However, this is not unique as this was also the case for social networks and role of place, even more so than personal characteristics. Because there is significant correlation between the different key-elements the results of this research should be handled carefully, Even though there are no severe multicollinearity issues according to the VIF-values.

4.3 The effects of the key-elements of ageing in place on happiness

In order to be able to say something about the importance of the key-elements of ageing in place, a multiple linear regression was conducted to investigate their effect on respondent's happiness. As mentioned earlier, happiness is associated with greater quality of life and life satisfaction (Gundelach and Kreiner, 2004; Prati, 2022; Steptoe, 2019). And can therefore give some idea about the importance of the key-elements of ageing in place.

In chapter 3, the assumption testing for the multiple linear regression is explained, in this chapter, the results will be explained. A base model, containing the five key-elements as independent variables was made. As explained earlier, the model uses latent variables. The dependent variable in the model is MeanOxfHapp, a latent variable made from the eight answers given in the Oxford happiness questionnaire.

4.3.1 Creating a base model including only the key-elements of ageing in place (independent variables) and happiness (dependent variable)

The base model was highly significant ($P = .000$), the R-square value was .371. meaning that just over 37 percent of the variance in Happiness is explained by the base-model. The adjusted R-square for the base-model was slightly lower at .333 . The adjusted R-square value tries to correct the model for the amount of independent variables that are added. The VIF values of the model were all between 1.244 (technology) and 2.025 (social networks) indicating no problems with multicollinearity. The results of the base model are shown in table 4. The syntax for the base model can be found in Appendix 6, the output for the base model can be found in Appendix 7.

Dependent: (MeanOxfHapp)	Unstandardized Coefficients		Collinearity statistics
	B	Standard Error	VIF
Role of place	.273***	.472	1.987
Technology	-.043	.083	1.244
Social Networks	-.039	.099	2.025
Support	-.014	.123	1.897
Personal characteristics	.419***	.117	1.388
***P<.01			

Table 4: Coefficients table for the base-model (dependent variable: MeanOxfHapp)

From table 4, it becomes clear that two of the five key-elements have a statistically significant influence on a respondent's happiness, role of place and personal characteristics. Role of place and personal characteristics both positively affect happiness. The B tells us that for every point a person scores higher on the key-element Role of place, they are expected to go up .273 points in their average score on the Oxford Happiness questionnaire. For personal characteristics, the B is even higher, for every point a person scored higher on the key-element personal characteristics, they are expected to go up .419 on their average happiness score. Both of these statistics are statistically significant ($P < 0.05$).

The other key-elements appear to have very small negative effects. The effects, although negative are incredibly small, less than .05 points. Because the effects are so small, a case can be made that the key-elements technology, social networks and support do not play a significant part in influencing a respondents happiness, at least for this sample. The results are not of statistical significance as all of the significance scores (p-values) are higher than .05, meaning that it cannot be said that the coefficients are distinguishable from zero at a 95% confidence interval. At this point, it should again be mentioned that the five key-elements are correlated, as mentioned in chapter 4.2 . Although there do not appear to be issues with multicollinearity, these results of this research should be handled carefully.

4.3.2 Adding control variables to the model (Dependent: Happiness)

Six control questions were put in the survey that was sent out to the eventual respondents. These questions related to the following topics:

Age, Sex, Marital status, Occupational status, Living arrangements and Financial situation.

The answers for these questions were coded into dummy variables to use in the regression. The reference groups for each control question are displayed in table 5. The syntax for creating the expanded model can be found in Appendix 8, the output can be found in Appendix 9.

Control question	Reference group
Age	65-75
Sex	Female
Marital status	Single
Occupational status	Retired
Living arrangements	Alone
Financial situation	Financially Neutral

Table 5: The control variables and their corresponding reference groups

The coefficients table for the expanded model with all the control variables added can be found in table 6. The R-square value for this model was: .496 meaning that just under 50 percent of the variance in Happiness is explained by the base-model. The adjusted R-square value of this model was .323 . The model was highly significant ($P = .001$).

Dependent: (MeanOxfHapp)	Unstandardized coefficients		Collinearity statistics	Unstandardized coefficients		Collinearity statistics
	B (Base model)	Std. Error (Base model)	VIF (Base model)	B (Extended model)	Std. Error (Expanded model)	VIF (Expanded model)
Role of place	0.273***	0.472	1.987	0.264***	0.094	2.469
Technology	-0.043	0.083	1.244	-0.137	0.089	1.611
Social Networks	-0.039	0.099	2.025	-0.038	0.111	2.471
Support	-0.014	0.123	1.897	-0.065	0.137	2.302
Personal Characteristics	0.419***	0.117	1.388	0.433***	0.129	1.654
Q_1=55 - 65				-0.339	0.206	2.464
Q_1=Older than 75				-0.110	0.143	1.620
Q_2=Man				-0.099	0.129	1.461
Q_3=Relationship, unmarried				0.250	0.234	2.404
Q_3=Divorced				-0.153	0.177	1.727
Q_3=Widowed				-0.059	0.213	1.701
Q_3=Married				0.138	0.303	6.774
Q_4=Working				0.228	0.229	2.461
Q_4=Not working, not retired				-0.006	0.229	1.608
Q_4=Different, open answer				-0.085	0.242	1.384
Q_5=Living together with partner and kids				-0.342	0.390	1.870
Q_5=Living together with partner				0.156	0.280	6.058
Q_5=Different open answer				0.093	0.267	1.151
Q_6=Sometimes worry financially				-0.135	0.198	1.462
Q_6=Financially healthy				-0.039	0.140	1.792
Q_6=Financially very healthy				0.088	0.198	1.603
Q_6=No answer / prefer not to say				0.548	0.544	1.240

*** $P < .01$

Table 6: The coefficients table for the base model and the model including all of the control variables (dependent variable: MeanOxfHapp)

From table 6 it becomes clear that “role of place” and “personal characteristics” are still the only two variables that significantly influence happiness. Although the VIF-values have risen slightly, they remain well below the critical value of 10. Adding control variables did not influence the statistical significance, or the strength of the relationship of role of place and personal characteristics. None of the added control variables had a significant or close to a significant influence on happiness.

4.3.3 Assumption testing

In order to successfully conduct a multiple linear regression, the model has to be tested for assumptions, these assumptions are: multicollinearity, absence of outliers, normality, linearity, homoscedasticity. Multicollinearity was no problem, as mentioned before all of the VIF values were lower than 10. Normality was checked for by looking at the PP-plot, although there was slight deviation from the line, the normality assumption has been met as there is no significant deviation from the line. It is probable that a larger sample would fit a normal distribution better, and that it is merely the modest size of this sample which is driving the minor deviation.

There are also no outliers, according to Pallant (2020), outliers can easily be checked by looking at the scatterplot produced by SPSS. All of the dots in the scatterplot should be between 3.3 and -3.3 on the scatterplot, this is the case for this regression. In the scatterplot, the linearity assumption can also be checked, the linearity assumption has also been met. Lastly the data should be checked for heteroscedasticity, the scatterplot shows no obvious patterns or a funnel shape which could indicate heteroscedasticity, therefore the assumption for homoscedasticity is also met.

The PP-plot and scatterplot used for assumption testing can be found in Appendix 9.

4.4 If respondents indicated to be less satisfied with the key-elements of ageing in place, does this increase willingness to move?

In order to gain a deeper understanding of the importance of the key-elements of ageing in place, it was also investigated if lower satisfaction with them, made residents of collective housing projects more likely to want to move if given the opportunity. In the survey the following statement was added: “If given the opportunity, I would want to move away from this place”. the answering possibilities were the same as the other statements. : 1. Wholeheartedly disagree 2. Disagree 3. Neutral 4. Agree 5. Wholeheartedly agree.

The responses for this question leaned heavily towards the disagreeing side, The responses per category are displayed in table 7.

If given the opportunity, I would want to move away from this place (Mean 2.07)	
Wholeheartedly disagree	48
Disagree	16
Neutral	20
Agree	12
Wholeheartedly agree	3

Table 7: Answers for statement "If given the opportunity, I would want to move away from this place"

4.4.1 Creating a base model with willingness to stay as dependent variable

For the statistical analysis, the scores were reversed and coded into a new variable called "Role_of_place6_recode" this was done to make the results easier to interpret, a higher score means a lower desire to move if given the opportunity. The syntax code for computing this variable can be found in appendix 3. From now on, when referring to willingness to move, this variable will be called willingness to stay to prevent confusion. A higher score means that people are more willing to stay and thus less willing to move.

A multiple linear regression was run in the same fashion as it was done for the effects of the key-elements of place on happiness. The dependent variable in this case was willingness to stay. The five key-elements were added as independent variables. The results are displayed in table 8. The model was significant ($P = .000$) and the R-square of this model was .511, meaning that just over 50 percent of the variance in willingness to stay could be explained by this model, the adjusted R-square of this model was .482. The results of this regression can be found in table 8. The syntax for creating the base model can be found in appendix 10, the output of the base model can be found in Appendix 11.

Dependent: (willingness to stay)	Unstandardized coefficients		Collinearity statistics
	B	Standard error	VIF
Happiness	0.087	0.205	1.590
Role of place	0.584***	0.164	2.250
Technology	0.015	0.143	1.249
Social networks	0.348***	0.184	2.029
Support	-0.333***	0.229	1.897
Personal characteristics	-0.114	0.234	1.606
*** $P < .01$			

Table 8: The coefficients table for the base model (Dependent variable: Willingness to stay)

Dependent: (willingness to stay)	Unstandardized coefficients	
	B	Standard error
Happiness	.638***	.203
*** $P < .01$		

Table 9: The coefficients for happiness as isolated independent variable (Dependent variable: Willingness to stay)

From table 8, it becomes clear that there are three key-elements that significantly influence willingness to stay. Role of place and social networks both positively influence willingness to stay, meaning that if people gave higher scores to these key-elements, they are less likely to indicate a desire to move. The key-element support had a highly significant, negative impact on willingness to stay. Happiness, in this model, has no significant effect on an individual's willingness to stay. Happiness was also tested in isolation (table 9). When happiness is the only independent variable in the model, it has a highly significant positive effect on willingness to stay. However, when adding happiness as an independent variable, in combination with the key-elements of ageing in place this effect becomes negligible ($B = .087$) and is no longer statistically significant ($P = .378$).

4.4.2 Adding control variables to the model (Dependent: Willingness to stay)

As in chapter 4.3, control variables will now be added to the model. The control variables added are the same, as are the reference groups for the control variables. For clarity, table 5 has been copied and is displayed below.

Control question	Reference group
Age	65-75
Sex	Female
Marital status	Single
Occupational status	Retired
Living arrangements	Alone
Financial situation	Financially Neutral

Table 5 (copy): The control variables and their corresponding reference groups

The coefficients table of the extended model with all the control variables added can be found in table 10. The R-square value for this model was: .682 meaning that just over 68 percent of the variance in willingness to stay is explained by the base-model. The adjusted R-square value of this model was .566. The model was highly significant ($P = .000$). The syntax for creating the expanded model can be found in Appendix 12, the output of the model can be found in Appendix 13.

Dependent: (Willingness to stay)	Unstandardized coefficients		Collinearity statistics	Unstandardized coefficients		Collinearity statistics
	B (Base model)	Std. Error (Base model)	VIF (Base-model)	B (Expanded model)	Std. Error (Expanded model)	VIF (Expanded model)
Happiness	0.087	0.205	1.590	-0.023	0.208	1.986
Role of place	0.584***	0.164	2.250	0.526***	0.165	2.777
Technology	0.015	0.143	1.249	0.002	0.151	1.670
Social networks	0.348***	0.184	2.029	0.454***	0.185	2.476
Support	-0.333***	0.229	1.897	-0.335***	0.228	2.310
Personal characteristics	-0.114	0.234	1.606	-0.075	0.232	1.944
Q_1=55 - 65				-0.115	0.350	2.568
Q_1=Older than 75				-0.129	0.239	1.635
Q_2=Man				-0.073	0.215	1.475
Q_3=Relationship, unmarried				-0.018	0.392	2.447
Q_3=Divorced				-0.153	0.295	1.747
Q_3=Widowed				0.141	0.354	1.703
Q_3=Married				0.041	0.505	6.796
Q_4=Working				-0.226*	0.384	2.499
Q_4=Not working, not retired				-0.108	0.380	1.608
Q_4=Different, open answer				-0.027	0.402	1.387
Q_5=Living together with partner and kids				0.111	0.652	1.892
Q_5=Living together with partner				0.080	0.466	6.088
Q_5=Different open answer				0.032	0.444	1.153
Q_6=Sometimes worry financially				-0.177*	0.329	1.473
Q_6=Financially healthy				-0.107	0.233	1.794
Q_6=Financially very healthy				0.085	0.330	1.608
Q_6=No answer / Prefer not say				-0.041	0.911	1.259

***P<.01 *P<.05

Table 10: The coefficients table for the base model and the model including all of the control variables (dependent variable: Willingness to stay)

In the coefficients table of the expanded model it can be seen that the variables that were significant before, are still significant. The effect of social networks has become bigger, support and role of place have not changed significantly. Two of the control variables are relevant at the .05 level, meaning that people who are working are less likely to want to stay than people who are retired. The other significant control variable is that respondents who sometimes worry financially are less likely to want to stay than people who are neutral about their financial situation. Although the VIF-values have risen in this model, there are still no issues with multicollinearity as the values all remain well below the critical threshold of 10.

It should again be mentioned that the five key-elements are correlated, as mentioned in chapter 4.2 . Although there do not appear to be issues with multicollinearity, these results of this research should be handled carefully.

4.4.3 Assumption testing

As was explained in chapter 4.3.3 there are assumptions to be tested when conducting a multiple linear regression. As this process was already explained in chapter 4.3.3 , and is the same for this model, this chapter will not explain the process again. All of the assumptions: multicollinearity, absence of outliers, normality, linearity, homoscedasticity were checked and there were no problems found. The relevant scatterplot and PP-plot can be found in Appendix 13.

5. Discussion and conclusion

The goal of this exploratory research was to gain an insight into the suitability of Dutch collective housing projects for ageing in place. With loneliness being a significant problem among Dutch elderly and a focus of ageing in place by the Dutch government (van den Berg et al., 2021; Zantinge et al., 2011), alternative forms of housing, such as collective housing can play an important part in reducing feelings of loneliness among elderly (Van Den Berg et al., 2023; van den Berg et al., 2021).

This chapter will start by summarizing the main findings of the research, after that, the findings will be related to the conceptual model. Relating the findings to the conceptual model will provide an answer to the main research question and sub-questions, here, the hypotheses will also be revisited. Chapter five will conclude with the contributions this study made to the field of research.

5.1 Discussing the findings

5.1.1 How do residents of Dutch collective housing projects experience the key-elements of ageing in place?

Most respondents to the questionnaire were either neutral about the key-elements of ageing in place, slightly positive or slightly negative as was discussed in chapter 4.1. The two key-elements that received the highest scores from the respondents were personal characteristics and role of place. Support should be mentioned here, although the mean score that was attributed to support was lower than the previously mentioned two key-elements, this was due to the addition of two questions about formal support. The two questions about formal support were answered more negatively, this could be because the people that took the time to participate in the survey were of good health and did not need formal support in their day-to-day lives. The survey was sent out to respondents with the help of housing corporations and knowledge platforms, none of the approached institutions were specialized in collective housing for older adults or collective housing with an emphasis on providing support. Therefore it is possible that the respondents reached were not in need of professional (formal) care. Another possibility could be that the amount of informal support experienced alleviated the need for formal support. As the two questions about formal support negatively influenced the internal validity of the questions about support, reflected in a bad Cronbach's alpha value, the two questions about formal support were excluded from the statistical analysis of this research. As a result, only informal support was a part of the statistical analysis.

The key-element that respondents attributed the lowest score to was technology. From the results it becomes clear that the key-element technology can be improved significantly within the collective housing projects respondents reside in. Although technology has much to offer, as was explained in the

theoretical framework of this research, it seems that this potential is at this time unfulfilled. For example, the addition of technologies to make cohousing projects more accessible would likely take some investments but could enable older adults with a physical disability to remain living independently for longer. Even the statement: “this cohousing project makes my life easier through the use of technology” got a relatively low score compared to the scores given to other statements (2.8/5).

Social networks got relatively positive scores that were all higher than 3.5, after reading the conceptual framework, where it became apparent that cohousing projects are known for their strong communities and place an emphasis on community, one could have expected these scores to be higher. The scores are difficult to interpret because there is no test population of people not living in collective housing projects. If this research was ever to be followed-up or revisited, collecting results from people not living in collective housing could benefit the research. All in all, the respondents were exceedingly positive about the social networks of their collective housing projects.

The last key-element that was included in chapter 4.1 is role of place. Role of place got relatively high scores from the respondents, meaning that the respondents felt at home, safe and comfortable in their cohousing projects. Once again, at this point a reference population of respondents not living in collective housing projects could provide a better, more complete analysis. Without a test population, it is difficult to say whether people residing in collective housing projects feel safer and more comfortable than those not living in a cohousing project. It is not hard to imagine that having a relatively strong social network around one’s place of residence, as was the case for the majority of people in the sample, positively influences the key-element role of place.

5.1.2 Correlation between the key-elements

As was discussed in chapter 4.2, there was significant correlation between all of the key-elements of ageing in place except technology. The key-elements role of place and social networks were significantly correlated with all of the other key-elements. Because the correlation values were lower than 0,700, the different key-elements can still be used in the same multiple regression (Pallant, 2020). However, it is very important to note that the results of this study should be handled with careful consideration. The correlation between the key-elements did not cause any problems with the VIF-values, all of the values were well below the threshold of 10, which indicates severe problems with multicollinearity. Although the correlation test was done to check for correlation between personal characteristics and the other key-elements, personal characteristics was not the key-element with the strongest correlation, which was the expectation. It was expected that personal characteristics would not be affected by collective housing in the same way as the other key-elements but that it would instead have an influence on the other key-elements. Even though there is correlation, this is not unique as this was

also the case for social networks and role of place and support, even more so than personal characteristics. Once again, because there is significant correlation between the key-elements, the results of this study should be handled with careful consideration.

5.1.3 The effects of the key-elements on happiness

In order to gain insights into the importance of the key-elements of ageing in place for respondents, the effects of the key-elements on respondent's happiness was studied. Happiness is generally associated with higher quality of life and life satisfaction (Prati, 2022). From the statistical analysis it became clear that two key-elements significantly influence happiness. These two key-elements are: Role of place and personal characteristics. The influence from personal characteristics is the largest, for every point a person's mean score on the statements regarding personal characteristics went up, their mean score on happiness was expected to go up by .419, this result is highly significant. The influence from role of place was smaller (.273) but also highly significant. Both key-elements remained significant and did not change when the control variables were added to the model. The control variables that were added to the model were a standard set of control variables for research about happiness (Prati, 2022). The fact that adding control variables did not affect the scores for role of place and personal characteristics makes it more likely that these key-elements have a significant impact on happiness. Because of their effects on happiness, these two key-elements can be seen as important.

The three key-elements that did not significantly affect happiness were technology, social networks and support. This is not in line with the literature because the literature tells us that social networks and support are of high importance for older adults (Boldy et al., 2011; Dijk et al., 2013; Lewis and Buffel, 2020; van Dijk et al., 2015). Technology not significantly influencing happiness is unsurprising. Although technology can be very helpful in enabling older people to age in place, it seems logical that other key-elements such as role of place and personal characteristics have a bigger and more significant effect. Because of a lack of influence on happiness, these three key-elements can be seen as less important than key-elements role of place and personal characteristics.

5.1.4 The effects of the key-elements on willingness to move

In order to gain an insight into the importance of the key-elements of ageing in place, this research also studied the effects of the key-elements on resident's willingness to move. After reading the literary framework, one would expect that respondents would be more willing to move (or less willing to stay) if the key-elements of ageing in place are well-represented.

To start off, happiness, when tested in isolation positively influences willingness to stay, people who reported greater happiness were also less likely to want to move. However, when adding the five key-elements of ageing in place into the regression the effect of happiness was insignificant. Of the five

key-elements of ageing in place, two positively influenced willingness to stay, these were role of place and social networks. One result stands out, the key-element support has a significant, negative influence on willingness to stay, meaning that respondents who experienced more informal support, were more likely to want to move when given the opportunity. One reason for this could be that people who are experiencing a lot of informal support are not being supported but are the ones supporting, which could be a burden. Alternatively these individuals could feel pressured because they receive informal support. This research does not have enough information to make these statements with certainty, therefore, if this research were to be repeated or followed up, it would be very interesting to see if these results hold true. One limitation of this research, pertaining to support is the exclusion of formal support in the statistical analysis, it is possible that adding formal support to the statistical analysis in future research could affect the results.

Adding control variables into the model did not change the effects of the key-elements. Two control variables were significant, both had a negative effect on willingness to stay. From the statistical analysis it became clear that people who are working were more likely to want to move than people who were retired. On the one hand it seems logical that people who are still working would be willing to move, for example if they get a job offer for a better paying job. On the other hand, people that have a job are tied to a place because of this job, which could also make them less likely to want to move than people who are retired and can go where they please. The other significant control variable was that people who sometimes worry financially were more likely to want to move than people that indicated to be neutral about their financial situation. This result is unsurprising as it could well be possible that the associated costs of living in their current residence are too much of a burden, making them want to relocate.

Social networks and role of place were positively related to willingness to stay. This result is unsurprising. Since role of place is about feeling safe, at home and comfortable, it would be more surprising if this key-element had a negative influence on willingness to stay. Social networks also positively affects willingness to stay, social networks is all about community and cohesion. As mentioned in the theoretical framework, these forms of social engagement positively affect subjective wellbeing and quality of life (Dijk et al., 2013).

Technology and personal characteristics did not influence willingness to move, for personal characteristics, this is unsurprising. The statements about personal characteristics were about resilience, adaptability and independence. The statements for this key-element did not relate to (collective) housing and therefore this result was to be expected. Technology not having a significant

influence on willingness to move is also unsurprising after seeing the results of the survey. Since technology is not particularly well-represented in the sample, gathering a lot of neutral answers.

5.1.5 Revisiting the conceptual model and hypotheses

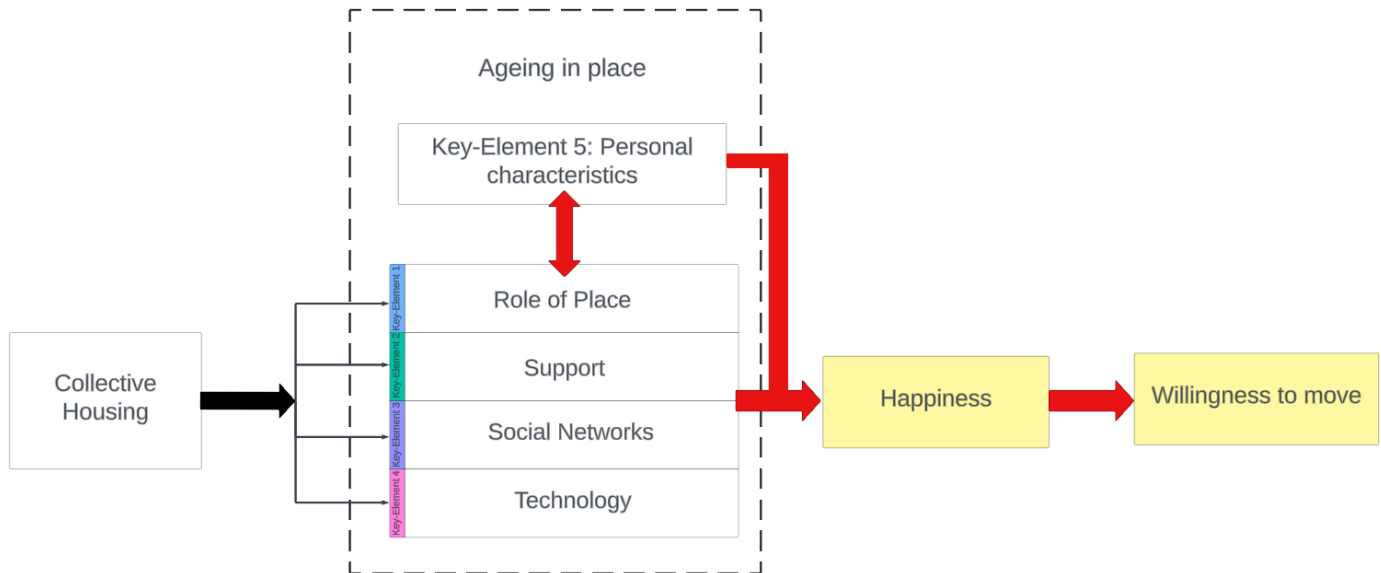


Figure 8: Copy of the conceptual model

As shown in the conceptual model, this research aimed to provide an insight into Dutch collective housing. The main research question was: **How does collective housing influence happiness for people ageing in place?** As can be seen in the model, ageing in place is made up out of five key-elements this research aimed at uncovering the effects of these key-elements on happiness for people living in collective housing projects. It was hypothesized that personal characteristics would influence the other key-elements. By uncovering the effect of the five key-elements of ageing in place on happiness, something can be said about their relative importance, as happiness is associated with greater quality of life and life satisfaction. Next to the effects of the key-elements on happiness, their effect on willingness to move was also studied. It was hypothesized that when the key-elements of ageing in place were not experienced, respondents would be more likely to want to move.

The hypotheses for the sub-questions were as follows:

H1: the five key-elements of ageing in place will have a positive effect on happiness.

H2: Residents who gave higher scores to the questions relating to personal characteristics will also give higher scores on the questions about the other key-elements.

H3: When residents report that the key-elements of ageing in place are not well-represented, these residents will be more willing to move away from the projects they live in.

Hypothesis one is partially rejected, only role of place and personal characteristics have a significant positive effect on happiness.

Hypothesis two is rejected. All five of the key-elements of ageing in place, with the exception of technology, were correlated. Therefore it cannot be said that this effect is unique to personal characteristics.

Hypothesis three is partially accepted: two of the five key elements positively affected willingness to stay, these being role of place and social networks. Support showed a negative influence, meaning that people who experienced more (informal) support were more likely to want to move when given the opportunity. Technology and personal characteristics did not have a significant effect on willingness to move or stay.

5.2 Conclusion

From this exploratory research can be concluded that people that reside in collective housing projects are generally positive about the key-elements of ageing in place, only technology received a relatively low score. From the key-elements, only personal characteristics and role of place significantly influenced happiness, both positively. Therefore these two key-elements are deemed the most important for happiness and therefore quality of life. In conclusion, collective housing positively affects most of the key-elements of ageing in place, however only two of the key-elements have a positive influence on happiness, one of them being personal characteristics which does not necessarily relate to collective housing.

From this research it can be concluded that three of the five key-elements have an influence on willingness to move. When the key elements social networks and role of place receive high scores, residents are less likely to want to move when given the opportunity. One unexpected result is that people who experience much informal support were more likely to want to move.

5.2.1 Theoretical implications

From this research it becomes clear that not all five of the key-elements of ageing in place have the same effects on happiness, therefore it can be argued that not all five key-elements share the same level of importance. Furthermore, it cannot be said that people are more likely to want to move when a key-element is not present or less present. It is likely that the relative importance of the key-elements in this regard are disproportionate.

5.2.2 Methodological innovations

This research created an easy to use figure for examining whether the key-elements of ageing in place are present in collective housing. Although the figure is inspired by Gupta's adaptive capacity wheel, the workings behind the figure are different and the similarities end at looks.

This research aimed to uncover the relative importance of the key-elements of ageing in place by relating them to happiness. Happiness is relatively easy to measure by means of a short questionnaire making this method of study very useful for short-natured surveys. As happiness is associated with higher quality of life and life satisfaction it was deemed as a good outcome variable.

5.2.3 Advice

This research advises that the emotional and physical connection to one's place of residence is crucial and has a significant effect on happiness. Additionally older adults are advised to maintain an active lifestyle and maintain independence and resilience as these also significantly influence happiness. Lastly technology, in this sample, has a lot of unfulfilled potential and therefore it is advised that new technologies that can enable ageing in place for longer, such as wheelchair ramps, escalators or even health monitoring systems should be added to collective housing projects for older adults. When possible, existing projects would do well to implement these technologies as well.

5.2.4 Limitations

The biggest limitation of this research is the absence of a test population. If this research would ever be repeated or followed up, a test population would make the results carry more weight. Additionally, it was found that there was a lot of correlation between the five key-elements of ageing in place. although this did not give problems regarding multicollinearity in the statistical analysis when looking at the VIF-values, the results of this study should be interpreted with care.

6. Reflection

Overall I would say that I am happy with final result of my thesis, even though it took me longer than expected. I experienced a lot of setbacks, most of them through my own doing. I had spent weeks on a theoretical basis for a research idea that I was not able to bring to fruition. After more than a month of working I decided to completely start over. I reread the reflection of my bachelor's thesis and it would seem that coming up with a strong research plan and idea is not one of my talents. When I started working on what would eventually become the final product of my thesis work started of relatively smoothly and got gradually harder towards the end as I was having great difficulties interpreting the statistics of my research. If I were to start my thesis again, I would likely not use the five key-elements of ageing in place again. In practice, technology just is not that important to older adults and formal support is really hard to get a good idea about when most of the respondents in the sample are of good health and care is not high on their agenda.

One thing that I am genuinely happy with is the data collection. Data collection was something I have lost a great deal of sleep to in the first months of my research. This was partly because in the first iteration of my research I had no idea what data I had to collect and how I was ever going to reach enough respondents. In the end, I managed to gain a sufficient amount of respondents and the quality of the data was pretty good. Of course, it could have been better, I would have benefitted from more respondents but given the time frame I am happy.

The results were a little disappointing to me, I would have liked to see that the key-elements of ageing in place played a bigger role in explaining variables such as happiness or willingness to move but I would say that I am not all that surprised to see the results. On a personal note I think that me re-learning SPSS to myself through a combination of Youtube and the SPSS survival guide by Pallant (2020) was more fun than I would have thought in the beginning and the more I used SPSS the better my understanding got. If I would ever write another thesis, I would go through the effort to learn how to use STATA or R as I think that those programmes work a lot better after everything I have learned, but in the timeframe I had for my thesis learning STATA or R would not have been possible I think.

Bibliography

- Actiz, De Wee, M., 2021. Zorgorganisaties aan de slag met nieuwe woonzorgvormen [WWW Document]. URL <https://www.actiz.nl/sites/default/files/2021-10/Zorgorganisaties-aan-de-slag-met-nieuwe-woonzorgvormen.pdf>
- Aliakbarzadeh Arani, Z., Zanjari, N., Delbari, A., Foroughan, M., Ghaedamini Harouni, G., 2022. Place attachment and aging: A scoping review. *J. Hum. Behav. Soc. Environ.* 32, 91–108. <https://doi.org/10.1080/10911359.2020.1860852>
- Alzheimer Nederland, nd. Wat moet ik regelen? [WWW Document]. Alzheimer Ned. URL <https://www.alzheimer-nederland.nl/dementie/wat-moet-ik-regelen> (accessed 7.16.24).
- Boldy, D., Grenade, L., Lewin, G., Karol, E., Burton, E., 2011. Older people's decisions regarding 'ageing in place': A Western Australian case study. *Australas. J. Ageing* 30, 136–142. <https://doi.org/10.1111/j.1741-6612.2010.00469.x>
- Buckner, J.C., 1988. The development of an instrument to measure neighborhood cohesion. *Am. J. Community Psychol.* 16, 771–791. <https://doi.org/10.1007/BF00930892>
- Buffel, T., Phillipson, C., 2023. Ageing in Place in Urban Environments: Critical Perspectives. Routledge, London. <https://doi.org/10.4324/9781003229322>
- CBS, 2023. Hoe vaak hebben ouderen contact met hun burens? - Nederland in cijfers 2023 | CBS [WWW Document]. Hoe Vaak Hebben Ouderen Contact Met Hun Burens - Ned. Cijfers 2023 CBS. URL <https://longreads.cbs.nl/nederland-in-cijfers-2023/hoe-vaak-hebben-ouderen-contact-met-hun-burens> (accessed 7.24.24).
- CBS, C.B. voor de S., 2024. Elderly people [WWW Document]. Stat. Neth. URL <https://www.cbs.nl/en-gb/visualisations/dashboard-population/age/elderly-people> (accessed 7.8.24).
- CBS, C.B. voor de S., 2023. Steeds meer honderdplussers, in Zeeland wonen de meesten [WWW Document]. Cent. Bur. Voor Stat. URL <https://www.cbs.nl/nl-nl/nieuws/2023/37/steeds-meer-honderdplussers-in-zeeland-wonen-de-meesten> (accessed 3.19.24).
- Costa, G., Arlotti, M., 2020. Ageing in place in different care regimes. The role of care arrangements and the implications for the quality of life and social isolation of frail older people [WWW Document]. Politec. Milano. URL <https://re.public.polimi.it/handle/11311/1149034> (accessed 3.20.24).
- Czischke, D., Peute, M., Brysch, S., 2023. Together: Towards Collaborative Living, 1e ed. nai010 uitgevers.
- Dijk, H.M.V., Cramm, J.M., Nieboer, A.P., 2013. Social cohesion as perceived by community-dwelling older people: the role of individual and neighbourhood characteristics. *Int. J. Ageing Later Life* 8, 9–31. <https://doi.org/10.3384/ijal.1652-8670.13210>
- Glass, A.P., 2020. Sense of community, loneliness, and satisfaction in five elder cohousing neighborhoods. *J. Women Aging* 32, 3–27. <https://doi.org/10.1080/08952841.2019.1681888>
- Grimmer, K., Kay, D., Foot, J., Pastakia, K., 2015. Consumer views about aging-in-place. *Clin. Interv. Aging* 10, 1803–1811. <https://doi.org/10.2147/CIA.S90672>
- Gundelach, P., Kreiner, S., 2004. Happiness and Life Satisfaction in Advanced European Countries. *Cross-Cult. Res.* 38, 359–386. <https://doi.org/10.1177/1069397104267483>

- Gupta, J., Termeer, C., Klostermann, J., Meijerink, S., van den Brink, M., Jong, P., Nootboom, S., Bergsma, E., 2010. The Adaptive Capacity Wheel: a method to assess the inherent characteristics of institutions to enable the adaptive capacity of society. *Environ. Sci. Policy* 13, 459–471. <https://doi.org/10.1016/j.envsci.2010.05.006>
- Hills, P., Argyle, M., 2002. The Oxford Happiness Questionnaire: a compact scale for the measurement of psychological well-being. *Personal. Individ. Differ.* 33, 1073–1082. [https://doi.org/10.1016/S0191-8869\(01\)00213-6](https://doi.org/10.1016/S0191-8869(01)00213-6)
- Horner, B., Boldy, D.P., 2008. The benefit and burden of “ageing-in-place” in an aged care community. *Aust. Health Rev.* 32, 356–365. <https://doi.org/10.1071/ah080356>
- Jansen, E., Pijpers, R., de Kam, G., 2018. Expanding Capabilities in Integrated Service Areas (ISAs) As Communities of Care: A Study of Dutch Older Adults’ Narratives on the Life They Have Reason to Value. *J. Hum. Dev. Capab.* 19, 232–248. <https://doi.org/10.1080/19452829.2017.1411895>
- Jefferies, P., Vanstone, R., Ungar, M., 2022. The Rugged Resilience Measure: Development and Preliminary Validation of a Brief Measure of Personal Resilience. *Appl. Res. Qual. Life* 17, 985–1000. <https://doi.org/10.1007/s11482-021-09953-3>
- Kearns, A., Whitley, E., Mason, P., Bond, L., 2012. ‘Living the High Life’? Residential, Social and Psychosocial Outcomes for High-Rise Occupants in a Deprived Context. *Hous. Stud.* 27, 97–126. <https://doi.org/10.1080/02673037.2012.632080>
- Kim, Jaehyun, Kim, Junhyoung, Han, A., 2020. Leisure Time Physical Activity Mediates the Relationship Between Neighborhood Social Cohesion and Mental Health Among Older Adults. *J. Appl. Gerontol.* 39, 292–300. <https://doi.org/10.1177/0733464819859199>
- Labit, A., 2015. Self-managed co-housing in the context of an ageing population in Europe. *Urban Res. Pract.* 8, 32–45. <https://doi.org/10.1080/17535069.2015.1011425>
- Lager, D., Van Hoven, B., Huigen, P.P.P., 2013. Dealing with change in old age: Negotiating working-class belonging in a neighbourhood in the process of urban renewal in the Netherlands. *Geoforum* 50, 54–61. <https://doi.org/10.1016/j.geoforum.2013.07.012>
- Lebrusán, I., Gómez, M.V., 2022. The Importance of Place Attachment in the Understanding of Ageing in Place: “The Stones Know Me.” *Int. J. Environ. Res. Public Health* 19, 17052. <https://doi.org/10.3390/ijerph192417052>
- Lewis, C., Buffel, T., 2020. Aging in place and the places of aging: A longitudinal study. *J. Aging Stud.* 54, 100870. <https://doi.org/10.1016/j.jaging.2020.100870>
- Miller, H.N., Thornton, C.P., Rodney, T., Thorpe, R.J.J., Allen, J., 2020. Social Cohesion in Health: A Concept Analysis. *Adv. Nurs. Sci.* 43, 375. <https://doi.org/10.1097/ANS.0000000000000327>
- Ollevier, A., Aguiar, G., Palomino, M., Simpelaere, I.S., 2020. How can technology support ageing in place in healthy older adults? A systematic review. *Public Health Rev.* 41, 26. <https://doi.org/10.1186/s40985-020-00143-4>
- Pallant, J., 2020. *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using IBM SPSS*, 7th Edition. ed. Open University Press.

Pani-Harreman, K.E., Bours, G.J.J.W., Zander, I., Kempen, G.I.J.M., Duren, J.M.A. van, 2021. Definitions, key themes and aspects of 'ageing in place': a scoping review. *Ageing Soc.* 41, 2026–2059. <https://doi.org/10.1017/S0144686X20000094>

Paterson, D.H., Govindasamy, D., Vidmar, M., Cunningham, D.A., Koval, J.J., 2004. Longitudinal Study of Determinants of Dependence in an Elderly Population. *J. Am. Geriatr. Soc.* 52, 1632–1638. <https://doi.org/10.1111/j.1532-5415.2004.52454.x>

Pijpers, R., de Kam, G., Dorland, L., 2016. Integrating Services for Older People in Aging Communities in The Netherlands: A Comparison of Urban and Rural Approaches. *J. Hous. Elder.* 30, 430–449. <https://doi.org/10.1080/02763893.2016.1224793>

Planbureau voor de Leefomgeving, 2019. Zelfstandig thuis op hoge leeftijd [WWW Document]. URL <https://themasites.pbl.nl/zelfstandig-thuis-hoge-leeftijd> (accessed 4.22.24).

Prati, G., 2022. Correlates of quality of life, happiness and life satisfaction among European adults older than 50 years: A machine-learning approach. *Arch. Gerontol. Geriatr.* 103, 104791. <https://doi.org/10.1016/j.archger.2022.104791>

Puplampu, V., Matthews, E., Puplampu, G., Gross, M., Pathak, S., Peters, S., 2020. The Impact of Cohousing on Older Adults' Quality of Life. *Can. J. Aging Rev. Can. Vieil.* 39, 406–420. <https://doi.org/10.1017/S0714980819000448>

Roberts, E., Bishop, A., Ruppert-Stroescu, M., Clare, G., Hermann, J., Singh, C., Balasubramanan, M., Struckmeyer, K.M., Kang, M., Slevitch, L., 2017. Active Aging for L.I.F.E.: An Intergenerational Public Health Initiative Addressing Perceptions and Behaviors Around Longevity, Independence, Fitness, and Engagement. *Top. Geriatr. Rehabil.* 33, 211. <https://doi.org/10.1097/TGR.0000000000000157>

Robison, J., Shugrue, N., Reed, I., Thompson, N., Smith, P., Gruman, C., 2011. Community-Based Versus Institutional Supportive Housing: Perceived Quality of Care, Quality of Life, Emotional Well-Being, and Social Interaction. *J. Appl. Gerontol.* 30, 275–303. <https://doi.org/10.1177/0733464810369810>

Ruiu, M.L., 2015. The effects of cohousing on the social housing system: the case of the Threshold Centre. *J. Hous. Built Environ.* 30, 631–644. <https://doi.org/10.1007/s10901-015-9436-7>

Rumeau, P., Vigouroux, N., Campo, E., Bougeois, E., Vella, F., Van Den Bossche, A., Val, T., Ancilotto, J., 2021. Technological Services in Shared Housing: Needs Elicitation Method from Home to Living Lab. *IRBM* 42, 73–82. <https://doi.org/10.1016/j.irbm.2020.06.013>

Sandstedt, E., Westin, S., 2015. Beyond Gemeinschaft and Gesellschaft. Cohousing Life in Contemporary Sweden. *Hous. Theory Soc.* 32, 131–150. <https://doi.org/10.1080/14036096.2015.1011687>

Steptoe, A., 2019. Happiness and Health. *Annu. Rev. Public Health* 40, 339–359. <https://doi.org/10.1146/annurev-publhealth-040218-044150>

Stevanovic, D., 2011. Quality of Life Enjoyment and Satisfaction Questionnaire – short form for quality of life assessments in clinical practice: a psychometric study. *J. Psychiatr. Ment. Health Nurs.* 18, 744–750. <https://doi.org/10.1111/j.1365-2850.2011.01735.x>

Sturge, J., Miedema, E., Elf, M., Nordin, S., 2023. Socially sustainable housing and built environments to support the health and social inclusion of older adults: protocol for a scoping review and stakeholder consultation. *BMJ Open* 13, e075447. <https://doi.org/10.1136/bmjopen-2023-075447>

Taber, K.S., 2018. The Use of Cronbach's Alpha When Developing and Reporting Research Instruments in Science Education. *Res. Sci. Educ.* 48, 1273–1296. <https://doi.org/10.1007/s11165-016-9602-2>

Vallabh, P., Malekian, R., 2018. Fall detection monitoring systems: a comprehensive review. *J. Ambient Intell. Humaniz. Comput.* 9, 1809–1833. <https://doi.org/10.1007/s12652-017-0592-3>

Van Den Berg, P., Sanders, J., Maussen, S., Kemperman, A., 2023. Collective self-build for senior friendly communities. Studying the effects on social cohesion, social satisfaction and loneliness. *Hous. Stud.* 38, 1323–1341. <https://doi.org/10.1080/02673037.2021.1941793>

van den Berg, P., van der Wielen, K., Maussen, S., Arentze, T., 2021. A path analysis of factors influencing social cohesion and neighbor support in collective self-build housing. The importance of getting to know future neighbors. *J. Hous. Built Environ.* 36, 965–989. <https://doi.org/10.1007/s10901-020-09807-8>

van Dijk, H.M., Cramm, J.M., Exel, J.V., Nieboer, A.P., 2015. The ideal neighbourhood for ageing in place as perceived by frail and non-frail community-dwelling older people. *Ageing Soc.* 35, 1771–1795. <https://doi.org/10.1017/S0144686X14000622>

van Tilburg, T., 2019. Ontevredenheid over netwerk leidt tot eenzaamheid ouderen. *TVZ - Verpleegkd. Prakt. En Wet.* 129, 16–18. <https://doi.org/10.1007/s41184-019-0102-5>

Vos, E.D., Spoormans, L., 2022. Collective Housing in Belgium and the Netherlands: A Comparative Analysis. *Urban Plan.* 7, 336–348.

Williams, J., 2005. Designing Neighbourhoods for Social Interaction: The Case of Cohousing. *J. Urban Des.* 10, 195–227. <https://doi.org/10.1080/13574800500086998>

Zantinge, E., van Wieren, S., Schoemaker, C., 2011. Gezond ouder worden in Nederland (Report). Rijksinstituut voor Volksgezondheid en Milieu RIVM.

Appendix

Appendix 1. Questionnaire

Below is the questionnaire that was sent out to respondents. **(R)**, refers to a negatively worded statement where scoring is reversed in the final scores. Statements that are marked with “*” are sourced from existing questionnaires and the sources are given underneath the tables containing the questions. Each statement in the questionnaire is also linked to the theoretical framework, this will also be explained underneath the tables containing the statements.

Introduction

Hallo en welkom! Allereerst wil ik u bedanken dat u de tijd neemt voor het invullen van mijn vragenlijst.

Mijn onderzoek gaat over het effect van collectief wonen op ageing in place (thuis blijven wonen op leeftijd).

Door de vergrijzende bevolking van Nederland is er een groeiende vraag naar alternatieve woonplekken die geschikt zijn voor oudere mensen. Collectief wonen kan hierin mogelijk een belangrijke rol spelen.

De vragenlijst is gericht aan bewoners van collectieve woonprojecten vanaf 55 jaar.

Het invullen van de gehele vragenlijst duurt minder dan 10 minuten. Het invullen van deze vragenlijst is anoniem en u wordt dan ook nergens gevraagd om uw naam of andere persoonsgegevens die naar u te herleiden zijn in te vullen.

Aan het einde van de vragenlijst is er ruimte voor eventuele opmerkingen. U kunt mij verder nog helpen door eventuele medebewoners ook te vragen om de vragenlijst in te vullen. Nogmaals enorm bedankt!

Mocht u vragen hebben aan mij, of ontvangt u graag een kopie van mijn onderzoek? dan kunt u mailen naar: g.timmerman@student.rug.nl

Consent

Ik ben me ervan bewust dat deelname aan deze vragenlijst geheel vrijwillig is, dat de data geanonimiseerd wordt en dat ik op ieder moment kan en mag stoppen. De antwoorden worden niet gedeeld met derden. Ik ga ermee akkoord dat mijn antwoorden gebruikt kunnen worden in deze studie.

One option: I agree (answer needed to continue to questionnaire)

Control questions

Woont in een collectieve woonvorm volgens de volgende beschrijving?

Met een collectieve woonvorm worden verschillende vormen van samen leven met meerdere huishoudens om gedeelde ruimtes heen (zoals een tuin of verzamelruimte) bedoeld. Ieder huishouden heeft een eigen woning binnen het project en de bewoners dragen samen ook een gedeelde verantwoordelijkheid voor het project.

Yes

No (routes to end of the questionnaire)

Gijs Timmerman (S377028)

Wat is uw leeftijd?

Jonger dan 55 (routes to explanation why survey is meant for people older than 55, then routes to end of questionnaire)

55 tot 65

65 tot 75

Ouder dan 75

Wat is uw geslacht?

Man

Vrouw

Anders

Zeg ik liever niet

Wat is uw burgerlijke staat?

Single

Relatie, ongehuwd

Gehuwd

Gescheiden

Verweduwd

Dit zeg ik liever niet

Wat is uw beroepsstatus?

Werkende

Niet werkende, niet gepensioneerd

Gepensioneerd

Anders, namelijk (text entry option)

Wat is uw woonsituatie?

Samenwonend met partner en kinderen

Samenwonend met partner

Op uzelf

Anders, namelijk: (text entry option)

Welke van deze antwoorden past het beste bij uw financiële situatie?

Financieel grote zorgen

Financieel soms zorgen

Financieel neutraal

Financieel gezond

Financieel zeer gezond

Geen antwoord / zeg ik lever niet

END OF CONTROL QUESTIONS AND FIRST BLOCK

START OF SECOND BLOCK (THE FIVE KEY ELEMENTS OF AGEING IN PLACE)

Explanation

De volgende vragen zijn onderverdeeld in vijf verschillende categorieën en bestaan uit stellingen. Lees de stellingen alstublieft goed door en denk niet te lang na over uw antwoord. Alle vragen hebben vijf verschillende antwoordopties, deze verwijzen naar:

1= Helemaal mee oneens

2= Mee oneens

3= Neutraal

4= Mee eens

5= Helemaal mee eens

Key-element one: Role of place

Statement	1	2	3	4	5
1: Ik voel mij veilig in en om mijn huis.					
2: In dit project, kan ik meebeslissen over de zaken die mijn dagelijks leven beïnvloeden.					
3: Over het algemeen vind ik het prettig om hier te wonen.*					
4: Ik voel me volledig op mijn plek waar ik nu woon.*					
5: Mijn huis is helemaal geschikt om heel oud in te worden.					
6: Als ik de kans zou hebben, dan zou ik verhuizen. (R)					

1. Refers to the importance of safety for older adults (Buffel and Phillipson, 2023; Ruijter, 2015).
2. Refers to the possibilities of joint-decision making processes in collective housing projects.
3. Taken from the neighbourhood social cohesion instrument (Buckner, 1988), slightly altered to fit collective housing.
4. Taken from the neighbourhood social cohesion instrument (Buckner, 1988), slightly altered to fit collective housing.
5. Refers to the suitability of homes for ageing in place as mentioned in (Pijpers et al., 2016).

Key-element two: Support

Statement	1	2	3	4	5
1: Ik help mijn buren regelmatig. (dit kan van alles zijn, van kleine klusjes tot verzorging)					
2: Binnen dit project is zorg van professionals makkelijk te regelen.					
3: Ik geloof dat mijn buren mij zullen helpen als ik hulp nodig heb.					
4: Ik ontvang in het dagelijks leven zorg van een professional.					
5: Als mijn buren mijn hulp nodig hebben dan schiet ik direct te hulp.					

1. Refers to strong communities in collective housing and the possibility of enabling informal care as observed by (Puplampu et al., 2020; Van Den Berg et al., 2023).

2. Refers to the possibility of cohousing projects working together with care professionals.
3. Refers to the importance of community in cohousing projects (Puplampu et al., 2020; Van Den Berg et al., 2023).
4. Refers to the possibility of cohousing projects working together with care professionals.
5. Refers to strong sense of community in cohousing (Puplampu et al., 2020; Van Den Berg et al., 2023).

Key-element three: Technology

Statement	1	2	3	4	5
1: Dit woonproject is volledig toegankelijk voor iedere bewoner, ook als ze een lichamelijke beperking hebben. (denkt u aan mensen met verminderde mobiliteit, of mensen in een rolstoel)					
2: Dit woonproject biedt genoeg faciliteiten om hulpverleners in te schakelen in geval van nood.					
3: Dit woonproject maakt mijn leven makkelijker door middel van technologie.					
4: Dit woonproject is geschikt voor mensen met verminderde cognitieve functies. (bijvoorbeeld dementie)					
5: Sommige technologieën die gebruikt worden binnen dit woonproject maken een inbreuk op mijn privacy. (R)					

1. Refers to inclusive design and the integration of technology in the design of a cohousing project.
2. Refers to working together with care professionals and incorporating technology for safety of older residents.
3. Refers to incorporating technology in the cohousing project.
4. Refers to inclusive design.
5. Refers to the incorporation of potentially intrusive technology such as fall detection monitoring systems or excessive use of cameras.

Key-element four: Social networks

Statement	1	2	3	4	5
1: Ik spreek mijn buren vaak.*					
2: Dit woonproject heeft een hechte gemeenschap.*					
3: Ik maak vaak gebruik van de gemeenschappelijke ruimtes van dit woonproject.					
4: Ik leen dingen van, en wissel gunsten uit met mijn buren.*					
5: Ik doe regelmatig dingen samen met mijn buren.					

1. Taken from the neighbourhood social cohesion instrument (Buckner, 1988), slightly altered to fit collective housing.
2. Taken from the neighbourhood social cohesion instrument (Buckner, 1988), slightly altered to fit collective housing.
3. Refers to the importance of added semi-private spaces as observed by (Williams, 2005).
4. Taken from the neighbourhood social cohesion instrument (Buckner, 1988), slightly altered to fit collective housing.
5. Refers to the importance of community and its effect on quality of life as found by (Czischke et al., 2023; Robison et al., 2011).

Key-element five: Personal characteristics

Statement	1	2	3	4	5
1: Ik heb een actieve levensstijl.					

2: Ik geloof in mezelf.						
3: Zelfs als ik obstakels of tegenslagen ervaar, blijf ik hoopvol voor de toekomst.						
4: Ik kan mij aanpassen aan uitdagende situaties.						
5: Ik zou meer hulp kunnen gebruiken in mijn dagelijkse leven. (R)						

1. Refers to the importance of maintaining an active lifestyle for older adults as observed by (Zantinge et al., 2011) and (Pani-Harreman et al., 2021)
2. Taken from an existing questionnaire on an individual's resilience as resilience is an important part of a person's characteristics according to (Pani-Harreman et al., 2021). The existing questionnaire is from (Jefferies et al., 2022).
3. Taken from the existing resilience questionnaire by (Jefferies et al., 2022).
4. Taken from the existing resilience questionnaire by (Jefferies et al., 2022).
5. Refers to the possibility of potential care needs not being met in a person's day-to-day life.

END OF BLOCK

Explanation and start of next block: Oxford Happiness Questionnaire (Hills and Argyle, 2002).

U bent bijna klaar met het invullen van de vragenlijst.

De laatste acht stellingen worden beantwoord op een zes-punt schaal. De zes punten verwijzen naar:

1: Helemaal mee oneens

2: mee oneens

3: een beetje mee oneens

4: een beetje mee eens

5: mee eens

6: helemaal mee eens

Statement	1	2	3	4	5	6
1: Het leven geeft mij veel voldoening.						
2: Ik ben mentaal volledig alert.						
3: Ik ben niet volledig tevreden met wie ik ben. (R)						
4: Ik kan schoonheid vinden in dingen.						
5: Ik ben volledig tevreden met alles in mijn leven.						
6: Ik kan de tijd vinden om alles te doen wat ik wil						
7: Ik vind mijzelf geen aantrekkelijk persoon. (R)						
8: Ik heb weinig vrolijke herinneringen aan het verleden. (R)						

END OF BLOCK

Last question

Hier wil ik u de kans geven om eventuele vragen of opmerkingen te delen

Text entry

End of survey

We thank you for your time spent taking this survey, your response has been recorded. (Default Qualtrics message)

Appendix 2. List of contacted corporations, organisations, Facebook groups and cohousing projects

Stichting Thuishuis Woerden, Harderwijk and Noordwijk <https://www.thuishuis.org> 8 connected projects, small scale, around 40 potential respondents

Collectief wonen Nederland <https://collectiefwonen.nl> , organisation, lots of connected projects, unknown amount of potential respondents

SOR <https://www.sor.nl> , collective housing corporation, 60 projects in the area of Rotterdam.

Villa Sterappel Lent in Lent <https://villasterappel.nl> One project, 9 residences

De Warren Amsterdam <https://dewarren.co> , one big larger scale project, 36 residences **Not interested**

Zorgzaam wonen <https://www.zorgzaamwonen.nl> knowledge platform, unknown reach of potential respondents

LVGO <https://www.lvgo.nl> , large scale collective housing corporation that specializes in ages 55+. Over 75 connected projects with an unknown amount of potential respondents. **Not interested**

Cooplink <https://www.cooplink.nl> , knowledge network that helps people set up and start potential cohousing projects. *Survey was shared in news letter*, unknown amount of potential respondents.

Samenwerktnu <https://samenwerkt.nu> (de derde bouwstroom), knowledge network that helps people set up and start potential cohousing projects. Shared on LinkedIn, unknown amount of potential respondents.

Zorgzaam wonen <https://www.zorgzaamwonen.nl> online platform for collective housing. Survey was sent to “a number” of people residing in collective housing, unknown amount of potential respondents.

Centrum groepswonen den Haag <https://www.centrumgroepswonen.nl> large scale housing corporation based in the Hague Netherlands, 52 projects in total. Survey was sent out to 150 residents of the corporation that registered their email with this corporation.

Facebook groups:

Gemeenschappelijk wonen / wooncoöperaties / woongroepen (28.929 members)

Woongemeenschappen LVGO (719 members)

The following message (or a variant of this message) was sent to housing corporations or projects in order to gain respondents

Mijn naam is Gijs Timmerman en ik ben een masterstudent aan de universiteit van Groningen. Mijn afstudeeronderzoek gaat over oudere inwoners van collectieve woonprojecten en de geschiktheid van collectief wonen voor oudere inwoners. Mijn onderzoek focust zich op belangrijke aspecten van thuis blijven wonen op leeftijd en hoe oudere inwoners van collectieve woonprojecten deze aspecten ervaren. Omdat SOR een grote organisatie is en ik mij kan voorstellen dat jullie in contact staan met vele projecten, hoop ik dat jullie mijn vragenlijst willen verspreiden onder bewoners. Bijvoorbeeld door deze door te sturen aan contactpersonen binnen jullie bij projecten, of door mijn vragenlijst toe te voegen aan een nieuwsbrief. De vragenlijst invullen kan tot en met 1 juli aanstaande. Andere organisaties, zoals Cooplink, stichting Thuishuis en Centrum groepswonen werken ook mee aan mijn onderzoek, hoe meer respondenten ik heb, hoe beter betrouwbaar de resultaten van mijn onderzoek zullen zijn.

Gijs Timmerman (S377028)

De vragenlijst is kort, invullen duurt minder dan 10 minuten en iedereen die ouder is dan 55 jaar en woonachtig is in een collectief woonproject kan hem invullen. Hoe meer mensen mijn onderzoek invullen, hoe meer mijn onderzoek kan bijdragen. Ik denk namelijk dat collectief wonen een belangrijke rol kan spelen in de vergrijzende bevolking van Nederland.

Hieronder zal ik een begeleidende tekst neerzetten die jullie eventueel bij de vragenlijst kunnen toevoegen, evenals een QR code die naar de vragenlijst leidt.

hierbij ook de link naar de vragenlijst. https://rug.eu.qualtrics.com/jfe/form/SV_bCIHiuNuYOzLzL0

Als u nog iets anders van mij nodig heeft, of vragen heeft dan kan u mij mailen naar dit mailadres, of bellen op +31644394819. Als u wil dan kan ik natuurlijk ook de eindversie van mijn onderzoek naar jullie toesturen als het klaar is, dit zal eind Augustus zijn.

Met vriendelijke groet,

Gijs Timmerman

This second part was also put in the Facebook groups but was also sent to housing corporations in order to potentially put in a newsletter.

Hallo!

Mijn naam is Gijs Timmerman, ik ben een masterstudent aan de universiteit van Groningen, ik doe onderzoek naar de geschiktheid van collectieve woonprojecten voor oudere mensen (55+), dit thuis blijven wonen wordt ook wel Ageing in Place genoemd. Mijn onderzoeksvraag is:

Hoe beïnvloedt collectief wonen ageing in place en geestelijke gesteldheid (happiness) van de bewoners?

Voor mijn onderzoek ben ik op zoek naar mensen van 55 jaar of ouder die in een collectief woonproject wonen om een korte vragenlijst (max. 10min) in te vullen. U kunt mij enorm helpen door de vragenlijst te delen met uw burens en natuurlijk zelf in te vullen!

Een eventuele link naar mijn vragenlijst:

https://rug.eu.qualtrics.com/jfe/form/SV_bCIHiuNuYOzLzL0

Het invullen van de vragenlijst duurt ongeveer 10 minuten en de vragenlijst is gericht aan bewoners van collectieve woonprojecten van 55 jaar of ouder.

Door de vergrijzende bevolking in Nederland is er een groeiende vraag naar woonplekken die geschikt zijn voor oudere mensen die niet in een verzorgingstehuis willen wonen, maar die mogelijk toch gebaat zouden zijn bij hulp. Ik denk dat collectief wonen hier een belangrijke rol in kan spelen en dat wil ik graag onderzoeken. Met mijn onderzoek hoop ik de voordelen van collectief wonen beter in kaart te brengen en het belang van projecten zoals dat van u te onderstrepen.

Als u vragen heeft over mijn onderzoek, of graag een versie van mijn afgeronde onderzoek wil ontvangen dan mag u natuurlijk een bericht sturen naar mijn mail: g.timmerman@student.rug.nl

Ik zal dan zo spoedig mogelijk reageren.

Appendix 3. Syntax code for reversing scores for negatively worded questions, computing latent variables for use in regression and creation of dummy variables for use in regression.

```
DATASET ACTIVATE DataSet1.
```

```
RECODE Oxford_Happiness__8 Oxford_Happiness__7 Oxford_Happiness__3 (1=6) (2=5) (3=4) (4=5) (5=2)  
(6=1) INTO Oxf_Hap8_recode Oxf_hap7_recode Oxf_hap3_recode.
```

```
EXECUTE.
```

```
RECODE Pers.Characteristics_5 (1=5) (2=4) (3=3) (4=2) (5=1) INTO Pers.char_5_recode.
```

```
EXECUTE.
```

```
RECODE Technology_5 (1=5) (2=4) (3=3) (4=2) (5=1) INTO technology_5_recoded.
```

```
EXECUTE.
```

```
RECODE Key_element_1_6 (1=5) (2=4) (3=3) (4=2) (5=1) INTO RoleofPlace_6_recode.
```

```
EXECUTE.
```

```
DATASET ACTIVATE DataSet1.
```

```
COMPUTE MeanPlaceAtt=(Key_element_1_1 + Key_element_1_2 + Key_element_1_3 + Key_element_1_4 +  
Key_element_1_5) / 5.
```

```
EXECUTE.
```

```
COMPUTE MeanSupp=(Support_1 + Support_2 + Support_3 + Support_4 + Support_5) / 5.
```

EXECUTE. This variable was deemed unusable because of bad Cronbach's Alpha value, new mean with better Cronbach's Alpha was Created. Syntax code line below this line:

```
COMPUTE NewMeanSupp=(Support_1 + Support_3 + Support_5) / 3.
```

```
EXECUTE.
```

```
COMPUTE MeanTechnology=(Technology_1 + Technology_2 + Technology_3 + Technology_4 +  
technology_5_recoded) / 5.
```

```
EXECUTE.
```

```
COMPUTE MeanSociNetw=(Social_Networks_1 + Social_Networks_2 + Social_Networks_3 + Social_Networks_4  
+ Social_Networks_5) / 5.
```

```
EXECUTE.
```

```
COMPUTE MeanPersChar=(Pers.Characteristics_1 + Pers.Characteristics_2 + Pers.Characteristics_3 +
```

Gijs Timmerman (S377028)

```
Pers.Characteristics_4 + Pers.char_5_recode) / 5.
```

```
EXECUTE.
```

```
COMPUTE MeanOxfHapp=(Oxford_Happiness__1 + Oxford_Happiness__2 + Oxf_hap3_recode +  
Oxford_Happiness__4 + Oxford_Happiness__5 + Oxford_Happiness__6 + Oxf_hap7_recode +  
Oxf_Hap8_recode) / 8.
```

```
EXECUTE.
```

Creation of dummy variables from control questions

```
DATASET ACTIVATE DataSet1.
```

```
SPSSINC CREATE DUMMIES VARIABLE=Vraag_1
```

```
ROOTNAME1=Age_dummy
```

```
/OPTIONS ORDER=A USEVALUELABELS=YES USEML=YES OMITFIRST=NO.
```

```
SPSSINC CREATE DUMMIES VARIABLE=Vraag_2
```

```
ROOTNAME1=Sex_dummy
```

```
/OPTIONS ORDER=A USEVALUELABELS=YES USEML=YES OMITFIRST=NO.
```

```
SPSSINC CREATE DUMMIES VARIABLE=Vraag_3
```

```
ROOTNAME1=married_dummy
```

```
/OPTIONS ORDER=A USEVALUELABELS=YES USEML=YES OMITFIRST=NO.
```

```
SPSSINC CREATE DUMMIES VARIABLE=Vraag_4
```

```
ROOTNAME1=Work_dummy
```

```
/OPTIONS ORDER=A USEVALUELABELS=YES USEML=YES OMITFIRST=NO.
```

```
SPSSINC CREATE DUMMIES VARIABLE=Vraag_5
```

```
ROOTNAME1=LivingArr_dummy
```

```
/OPTIONS ORDER=A USEVALUELABELS=YES USEML=YES OMITFIRST=NO.
```

```
SPSSINC CREATE DUMMIES VARIABLE=Vraag_6
```

```
ROOTNAME1=FinanSituDUM
```

```
/OPTIONS ORDER=A USEVALUELABELS=YES USEML=YES OMITFIRST=NO.
```

Appendix 4: Syntax code for calculating internal validity of questions (Cronbach's Alpha)

```
DATASET ACTIVATE DataSet1.
```

```
RELIABILITY
```

```
/VARIABLES=Key_element_1_1 Key_element_1_2 Key_element_1_3 Key_element_1_4 Key_element_1_5
```

Gijs Timmerman (S377028)

```
/SCALE('ALL VARIABLES') ALL
```

```
/MODEL=ALPHA.
```

RELIABILITY

```
/VARIABLES=Support_1 Support_2 Support_3 Support_4 Support_5
```

```
/SCALE('ALL VARIABLES') ALL
```

```
/MODEL=ALPHA.
```

RELIABILITY

```
/VARIABLES=Technology_1 technology_5_recoded Technology_2 Technology_3 Technology_4
```

```
/SCALE('ALL VARIABLES') ALL
```

```
/MODEL=ALPHA.
```

RELIABILITY

```
/VARIABLES=Social_Networks_1 Social_Networks_2 Social_Networks_3 Social_Networks_4
```

```
Social_Networks_5
```

```
/SCALE('ALL VARIABLES') ALL
```

```
/MODEL=ALPHA.
```

RELIABILITY

```
/VARIABLES=Pers.char_5_recode Pers.Characteristics_1 Pers.Characteristics_2
```

```
Pers.Characteristics_3 Pers.Characteristics_4
```

```
/SCALE('ALL VARIABLES') ALL
```

```
/MODEL=ALPHA.
```

RELIABILITY

```
/VARIABLES=Oxf_Hap8_recode Oxf_hap7_recode Oxf_hap3_recode Oxford_Happiness__6
```

```
Oxford_Happiness__5 Oxford_Happiness__4 Oxford_Happiness__2 Oxford_Happiness__1
```

```
/SCALE('ALL VARIABLES') ALL
```

```
/MODEL=ALPHA.
```

Appendix 5. Output of calculating Cronbach's Alpha for key-elements of ageing in place

DATASET ACTIVATE DataSet1.

RELIABILITY

```
/VARIABLES=Key_element_1_1 Key_element_1_2 Key_element_1_3 Key_element_1_4  
Key_element_1_5
```

```
/SCALE('ALL VARIABLES') ALL
```

/MODEL=ALPHA.

Reliability Statistics

Cronbach's Alpha	N of Items
,897	5

RELIABILITY

/VARIABLES=Support_1 Support_2 Support_3 Support_4 Support_5

/SCALE('ALL VARIABLES') ALL

/MODEL=ALPHA.

Reliability Statistics

Cronbach's Alpha	N of Items
,381	5

RELIABILITY

/VARIABLES=Technology_1 technology_5_recoded Technology_2 Technology_3 Technology_4

/SCALE('ALL VARIABLES') ALL

/MODEL=ALPHA.

Reliability Statistics

Cronbach's Alpha	N of Items
,663	5

RELIABILITY

/VARIABLES=Social_Networks_1 Social_Networks_2 Social_Networks_3 Social_Networks_4

Social_Networks_5

/SCALE('ALL VARIABLES') ALL

/MODEL=ALPHA.

Reliability Statistics

Cronbach's Alpha	N of Items
,811	5

RELIABILITY

```

/VARIABLES=Pers.char_5_recode Pers.Characteristics_1 Pers.Characteristics_2
Pers.Characteristics_3 Pers.Characteristics_4
/SCALE('ALL VARIABLES') ALL
/MODEL=ALPHA.
    
```

Reliability Statistics

Cronbach's Alpha	N of Items
,780	5

RELIABILITY

```

/VARIABLES=Support_1 Support_2 Support_3 Support_4 Support_5
/SCALE('ALL VARIABLES') ALL
/MODEL=ALPHA
/SUMMARY=TOTAL.
    
```

Reliability Statistics

Cronbach's Alpha	N of Items
,381	5

Item-Total Statistics

Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted

Geeft u alstublieft aan hoe u denkt over de volgende stellingen. - 1. Ik help mijn buren regelmatig (dit kan van alles zijn, van kleine klusjes tot verzorging)	12,89	4,074	,311	,234
Geeft u alstublieft aan hoe u denkt over de volgende stellingen. - 2. Binnen dit project is zorg van professionals is makkelijk te regelen	13,49	4,019	,233	,292
Geeft u alstublieft aan hoe u denkt over de volgende stellingen. - 3. Ik geloof dat mijn buren mij zullen helpen als ik hulp nodig heb	12,73	4,095	,349	,212
Geeft u alstublieft aan hoe u denkt over de volgende stellingen. - 4. Ik ontvang in mijn dagelijks leven zorg van een professional	14,95	5,284	-,106	,584
Geeft u alstublieft aan hoe u denkt over de volgende stellingen. - 5. Als mijn buren mijn hulp nodig hebben dan schiet ik direct te hulp	12,67	4,329	,298	,256

RELIABILITY

/VARIABLES=Support_1 Support_2 Support_3 Support_5

/SCALE('ALL VARIABLES') ALL

/MODEL=ALPHA

/SUMMARY=TOTAL.

Reliability Statistics

Cronbach's Alpha	N of Items
,581	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Geeft u alstublieft aan hoe u denkt over de volgende stellingen. - 1. Ik help mijn burens regelmatig (dit kan van alles zijn, van kleine klusjes tot verzorging)	11,16	3,312	,372	,502
Geeft u alstublieft aan hoe u denkt over de volgende stellingen. - 2. Binnen dit project is zorg van professionals is makkelijk te regelen	11,74	3,542	,210	,645
Geeft u alstublieft aan hoe u denkt over de volgende stellingen. - 3. Ik geloof dat mijn burens mij zullen helpen als ik hulp nodig heb	10,97	3,315	,443	,449
Geeft u alstublieft aan hoe u denkt over de volgende stellingen. - 5. Als mijn burens mijn hulp nodig hebben dan schiet ik direct te hulp	10,92	3,340	,469	,434

Appendix 6: Syntax for the base model (dependent variable: happiness)

DATASET ACTIVATE DataSet1.

REGRESSION

/DESCRIPTIVES MEAN STDDEV CORR SIG N

Gijs Timmerman (S377028)

```

/MISSING LISTWISE
/STATISTICS COEFF OUTS R ANOVA COLLIN TOL CHANGE
/CRITERIA=PIN(.05) POUT(.10)
/NOORIGIN
/DEPENDENT MeanOxfHapp
/METHOD=ENTER MeanPlaceAtt MeanTechnology MeanSociNetw MeanPersChar NewMeanSupp
/SCATTERPLOT=(*ZRESID,*ZPRED)
/RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).

```

Appendix 7: Output for the base model (dependent variable: happiness)

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,609 ^a	,371	,333	,47993	,371	9,673	5	82	,000

a. Predictors: (Constant), NewMeanSupp, MeanTechnology, MeanPersChar, MeanPlaceAtt, MeanSociNetw

b. Dependent Variable: MeanOxfHapp

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	2,371	,472		5,024	,000		
	MeanPlaceAtt	,273	,083	,407	3,296	,001	,503	1,987
	MeanTechnology	-,043	,077	-,055	-,563	,575	,804	1,244
	y							
	MeanSociNetw	-,039	,099	-,050	-,399	,691	,494	2,025
	MeanPersChar	,419	,117	,371	3,591	,001	,721	1,388
	NewMeanSupp	-,014	,123	-,014	-,116	,908	,527	1,897

a. Dependent Variable: MeanOxfHapp

Appendix 8: Syntax for the expanded model (dependent variable: happiness)

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REGRESSION
/DESCRIPTIVES MEAN STDDEV CORR SIG N

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/MISSING LISTWISE
/STATISTICS COEFF OUTS R ANOVA COLLIN TOL
/CRITERIA=PIN(.05) POUT(.10)
/NOORIGIN
/DEPENDENT MeanOxfHapp
/METHOD=ENTER MeanPlaceAtt MeanTechnology MeanSociNetw MeanPersChar NewMeanSupp Age_55_64
Age_75plus Sex_male MS_relaNOMarried MS_divorce MS_widowed MS_married Work_Working
Work_NoWorkNoRetire Work_different LA_PartnerKids LA_Partner LA_different FinanSomszorg
Finan_Gezond Finan_Zeergez Finan_GeenAnt
/SCATTERPLOT=(*ZRESID,*ZPRED)
/RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).
    
```

Appendix 9 Output for the expanded model (dependent variable: happiness)

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,705 ^a	,496	,323	,48587

- a. Predictors: (Constant), Vraag_6=Geen antwoord / zeg ik liever niet., Vraag_5=Samenwonend met partner en kinderen, Vraag_5=Anders namelijk:, Vraag_1=Ouder dan 75, MeanPersChar, Vraag_4=Anders, namelijk, Vraag_6=Financieel soms zorgen, Vraag_3=Gescheiden, MeanTechnology, Vraag_2=Man, Vraag_4=Niet werkende, niet gepensioneerd, Vraag_6=Financieel zeer gezond, Vraag_3=Relatie, ongehuwd, MeanSociNetw, Vraag_3=Verweduwd, Vraag_4=Werkende, Vraag_6=Financieel gezond, Vraag_5=Samenwonend met partner, NewMeanSupp, MeanPlaceAtt, Vraag_1=55 tot 65, Vraag_3=Gehuwd
- b. Dependent Variable: MeanOxfHapp

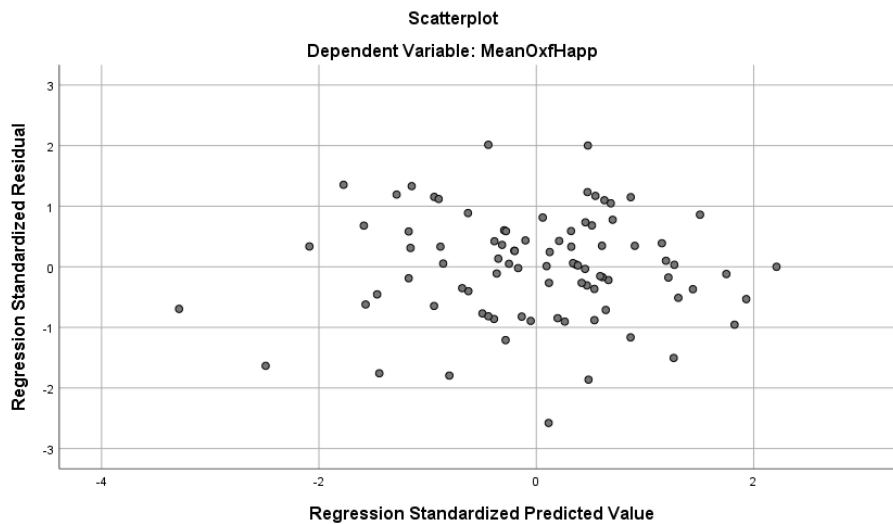
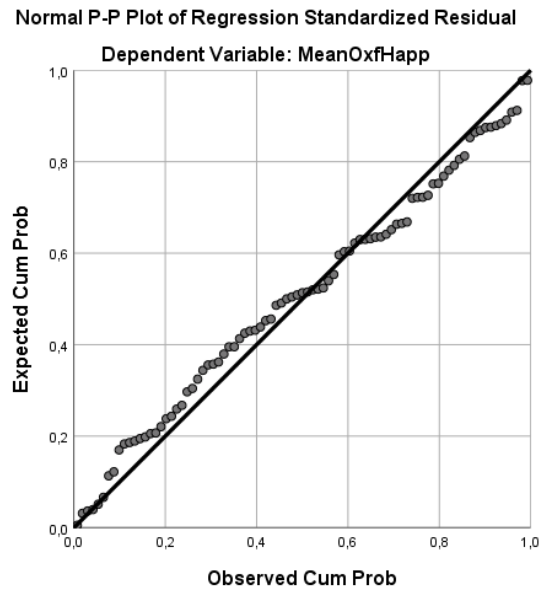
Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	2,883	,538		5,362	,000		
	MeanPlaceAtt	,264	,094	,394	2,824	,006	,405	2,469

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MeanTechnology	-,137	,089	-,172	-1,528	,131	,621	1,611
MeanSociNetw	-,038	,111	-,048	-,341	,734	,405	2,471
MeanPersChar	,433	,129	,383	3,353	,001	,605	1,654
NewMeanSupp	-,065	,137	-,063	-,470	,640	,434	2,302
Vraag_1=55 tot 65	-,339	,206	-,229	-1,644	,105	,406	2,464
Vraag_1=Ouder dan 75	-,110	,143	-,087	-,768	,445	,617	1,620
Vraag_2=Man	-,099	,129	-,083	-,770	,444	,684	1,461
Vraag_3=Relatie, ongetrouwd	,250	,234	,147	1,065	,291	,416	2,404
Vraag_3=Gescheiden	-,153	,177	-,101	-,863	,391	,579	1,727
Vraag_3=Verweduwd	-,059	,213	-,032	-,277	,783	,588	1,701
Vraag_3=Gehuwd	,138	,303	,105	,456	,650	,148	6,774
Vraag_4=Werkende	,228	,229	,139	,996	,323	,406	2,461
Vraag_4=Niet werkende, niet gepensioneerd	-,006	,229	-,003	-,028	,978	,622	1,608
Vraag_4=Anders, namelijk	-,085	,242	-,037	-,350	,727	,722	1,384
Vraag_5=Samenwone nd met partner en kinderen	-,342	,390	-,106	-,877	,384	,535	1,870
Vraag_5=Samenwone nd met partner	,156	,280	,122	,559	,578	,165	6,058
Vraag_5=Anders namelijk:	,093	,267	,033	,349	,728	,869	1,151
Vraag_6=Financieel soms zorgen	-,135	,198	-,073	-,683	,497	,684	1,462
Vraag_6=Financieel gezond	-,039	,140	-,033	-,279	,781	,558	1,792
Vraag_6=Financieel zeer gezond	,088	,198	,050	,445	,657	,624	1,603
Vraag_6=Geen antwoord / zeg ik liever niet.	,548	,544	,100	1,008	,317	,807	1,240

a. Dependent Variable: MeanOxfHapp



Appendix 10 Syntax for base model (dependent variable willingness to move)

REGRESSION

/DESCRIPTIVES MEAN STDDEV CORR SIG N

/MISSING LISTWISE

/STATISTICS COEFF OUTS R ANOVA COLLIN TOL

/CRITERIA=PIN(.05) POUT(.10)

/NOORIGIN

/DEPENDENT RoleofPlace_6_recode

/METHOD=ENTER MeanOxfHapp MeanPlaceAtt MeanTechnology MeanSociNetw NewMeanSupp MeanPersChar

/SCATTERPLOT=(*ZRESID,*ZPRED)

/RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).

Appendix 11 Outcome for base model (dependent variable: willingness to move)

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,710 ^a	,504	,467	,89200

a. Predictors: (Constant), MeanPersChar, MeanTechnology, MeanSociNetw, MeanOxfHapp, NewMeanSupp, MeanPlaceAtt

b. Dependent Variable: RoleofPlace_6_recode

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	1,409	1,003		1,405	,164		
	MeanOxfHapp	,182	,205	,087	,886	,378	,629	1,590
	MeanPlaceAtt	,814	,164	,584	4,972	,000	,444	2,250
	MeanTechnology	,024	,143	,015	,168	,867	,801	1,249
	MeanSociNetw	,575	,184	,348	3,121	,002	,493	2,029
	NewMeanSupp	-,706	,229	-,333	-3,089	,003	,527	1,897
	MeanPersChar	-,268	,234	-,114	-1,147	,255	,623	1,606

a. Dependent Variable: RoleofPlace_6_recode

Appendix 12 Syntax for expanded model (dependent variable: willingness to move)

REGRESSION

/DESCRIPTIVES MEAN STDDEV CORR SIG N

/MISSING LISTWISE

/STATISTICS COEFF OUTS R ANOVA COLLIN TOL

/CRITERIA=PIN(.05) POUT(.10)

/NOORIGIN

/DEPENDENT RoleofPlace_6_recode

```

/METHOD=ENTER MeanOxfHapp MeanPlaceAtt MeanTechnology MeanSociNetw NewMeanSupp MeanPersChar
Age_55_64 Age_75plus Sex_male MS_relaNOmarried MS_divorce MS_widowed MS_married Work_Working
Work_NoWorkNoRetire Work_different LA_PartnerKids LA_Partner LA_different FinanSomszorg
Finan_Gezond Finan_Zeergez Finan_GeenAnt
/SCATTERPLOT=(*ZRESID,*ZPRED)
/RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID).

```

Appendix 13: Output for expanded model (dependent variable: willingness to move)

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,826 ^a	,682	,566	,80689

a. Predictors: (Constant), Vraag_6=Geen antwoord / zeg ik liever niet., Vraag_5=Samenwonend met partner en kinderen, Vraag_5=Anders namelijk., Vraag_1=Ouder dan 75, MeanPersChar, Vraag_4=Anders, namelijk, Vraag_6=Financieel soms zorgen, Vraag_3=Gescheiden, MeanTechnology, Vraag_2=Man, Vraag_4=Niet werkende, niet gepensioneerd, Vraag_6=Financieel zeer gezond, Vraag_3=Relatie, ongehuwd, MeanSociNetw, Vraag_3=Verweduwd, Vraag_4=Werkende, MeanOxfHapp, Vraag_6=Financieel gezond, Vraag_5=Samenwonend met partner, NewMeanSupp, Vraag_1=55 tot 65, MeanPlaceAtt, Vraag_3=Gehuwd

b. Dependent Variable: RoleofPlace_6_recode

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	2,353	1,075		2,189	,032		
	MeanOxfHapp	-,048	,208	-,023	-,231	,818	,504	1,986
	MeanPlaceAtt	,733	,165	,526	4,445	,000	,360	2,777
	MeanTechnology	,004	,151	,002	,026	,979	,599	1,670
	MeanSociNetw	,750	,185	,454	4,060	,000	,404	2,476
	NewMeanSupp	-,708	,228	-,335	-3,102	,003	,433	2,310
	MeanPersChar	-,175	,232	-,075	-,752	,455	,514	1,944
	Vraag_1=55 tot 65	-,354	,350	-,115	-1,013	,315	,389	2,568

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Vraag_1=Ouder dan 75	-,338	,239	-,129	-1,414	,162	,612	1,635
Vraag_2=Man	-,182	,215	-,073	-,847	,400	,678	1,475
Vraag_3=Relatie, ongetrouwd	-,063	,392	-,018	-,161	,873	,409	2,447
Vraag_3=Gescheiden	-,479	,295	-,153	-1,624	,109	,572	1,747
Vraag_3=Verweduwd	,538	,354	,141	1,519	,134	,587	1,703
Vraag_3=Gehuwd	,113	,505	,041	,224	,824	,147	6,796
Vraag_4=Werkende	-,770	,384	-,226	-2,007	,049	,400	2,499
Vraag_4=Niet werkende, niet gepensioneerd	-,453	,380	-,108	-1,193	,237	,622	1,608
Vraag_4=Anders, namelijk	-,127	,402	-,027	-,317	,752	,721	1,387
Vraag_5=Samenwone nd met partner en kinderen	,739	,652	,111	1,133	,261	,528	1,892
Vraag_5=Samenwone nd met partner	,213	,466	,080	,456	,650	,164	6,088
Vraag_5=Anders namelijk:	,184	,444	,032	,414	,680	,867	1,153
Vraag_6=Financieel soms zorgen	-,675	,329	-,177	-2,050	,045	,679	1,473
Vraag_6=Financieel gezond	-,262	,233	-,107	-1,126	,265	,557	1,794
Vraag_6=Financieel zeer gezond	,311	,330	,085	,942	,350	,622	1,608
Vraag_6=Geen antwoord / zeg ik liever niet.	-,464	,911	-,041	-,509	,612	,794	1,259

a. Dependent Variable: RoleofPlace_6_recode

