

Healthy housing: the effects on life satisfaction of elderly in the Netherlands

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COLOFON

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ABSTRACT

In the Netherlands, the share of elderly in the population grows, households become smaller, people live longer and elderly stay in their big family homes because of the lack of suitable alternatives. The pressure on the housing market and the health care sector is growing. When elderly do not live in a good environment or do not receive proper health care, their well-being may decrease. Therefore, this research aims to analyse the relationship between the current living situation of elderly, in terms of health status, household composition, housing and neighbourhood characteristics, and their overall life-satisfaction. This theses finds evidence for a positive effect on overall life satisfaction by a higher subjective health perception and for elderly not living alone in their household. For the housing characteristics, only the desire to move and the adaptation of houses to a disability affect overall life satisfaction negatively. The type of house, surface and specific elderly house show no effects. On the neighbourhood level, only the sense of feeling at home in the neighbourhood shows a positive effect. Distances to facilities and type of neighbourhood show no effect. This means that health care provision and loneliness are prime considerations for policy-making on housing elderly.

Keywords: healthy ageing, life satisfaction, housing market

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1. INTRODUCTION

This first chapter introduces the main reasoning behind this thesis. The societal relevance as well as the academic relevance are elaborated. Then, the research problem, aim and questions are stated and explained by use of a conceptual model.

1.1 Motivation

The Dutch housing market is under increasing pressure (CBS, 2021e). The Netherlands is coping with an excess-demand compared to new supply of houses. Even though new houses are built, two reasons exist for the inability of supply to match demand (CBS, 2021a). Firstly, the Dutch population has grown in total over the past century, from 6,87 million in 1921 to 17,59 million in 2021 as is visualized in figure 1 (CBS, 2021b). Secondly, the average number of people living per house decreased from 4.8 in 1921 to 2.2 in 2021 (CBS, 2021a).

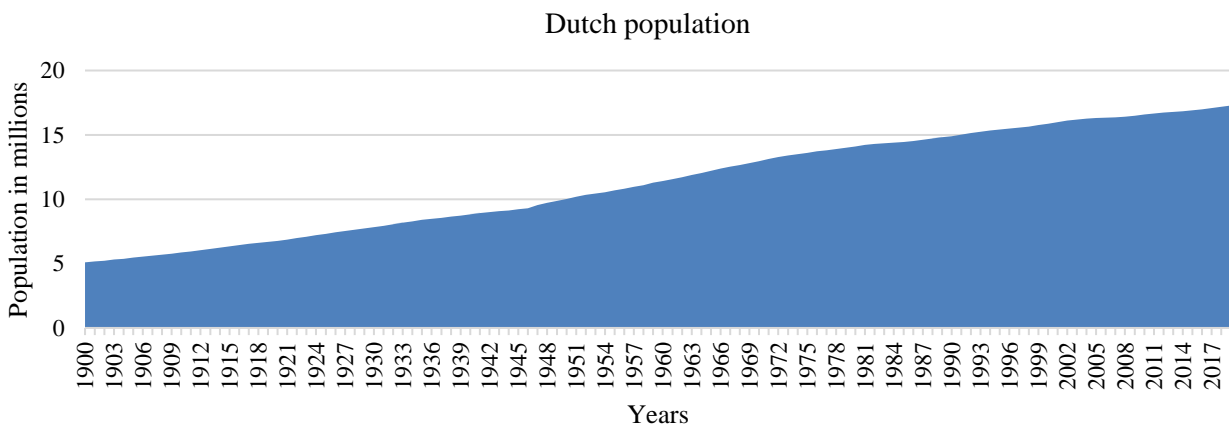


Figure 1: Dutch population growth (source: CBS, 2021b)

Another trend is the changing composition of age-structure in the Dutch population (CBS, 2021d). A larger share of the population has become older than 65 (CBS, 2021d). In 2021, about 20% of the Dutch population is 65 years old or older as can be seen in figure 2 (CBS, 2021c) This growing group of elderly is a consequence of improved health care and the large number of babies born after the Second World War (CBS, 2016). The trends of the ageing population are predicted to continue in the coming decades (CBS, 2021d).

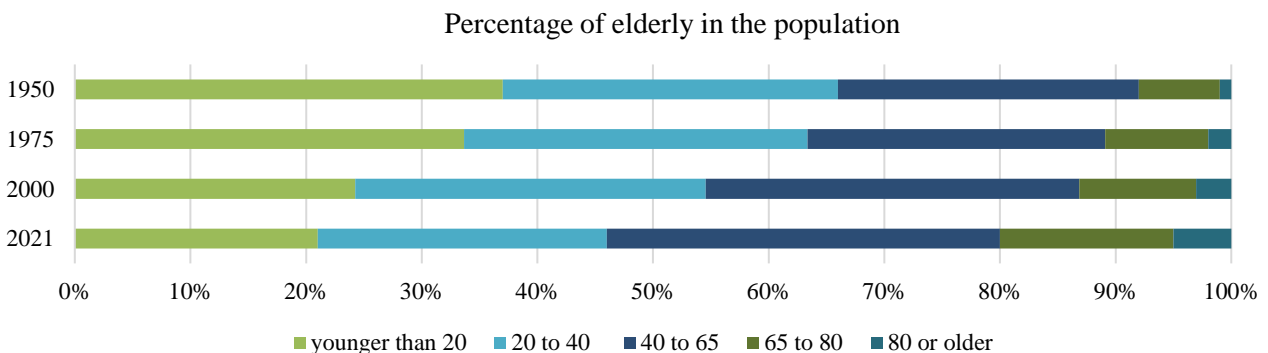


Figure 2: Age distribution of the Netherlands (source: CBS 2021c)

The contemporary older population group lives differently than former generations of elderly. Because of the improved health care, elderly live independently until an older age, instead of moving to a nursing home. Their own house is sometimes adapted to make the house more suitable for their health defects (Rijksoverheid, 2021a). Consequently, elderly stay in types of houses that were not designed for them at this age, which may have consequences for their health due to the shortcomings in functionality of the design (NOS, 2021b; CBS, 2021e). As a result of the trends described above, the health care challenge has become larger and more complex over the past years (Actiz, 2020). First, the Netherlands has a shortage of medical staff. Second, the waiting lists for nursing homes expand due to the growing group of elderly people and a shortage of available space, resulting in increasing demand for health care at home (Actiz, 2021; Vilans, 2021). Care at home is more time consuming than care in nursing homes due to the travel time between the clients (Actieagenda Wonen, 2021). As a consequence of the increasing amount of elderly living scattered throughout places, the shortage of places in nursing homes, and the increasing shortage of medical staff, elderly may not receive the health care they need. Therefore, since health is an important influence, the well-being of elderly may decrease (CBS, 2011).

This research focuses on connecting the current housing situation to the overall satisfaction of people older than 65, by taking into account their health situation, household composition, housing characteristics of their current home, and neighbourhood characteristics of their current neighbourhood in the current Dutch context. The results may help governments in decision-making in the housing and health care sectors to solve this growing societal problem.

1.2 Academic relevance

Several papers focus on explaining the housing demand and preferences of elderly. Coleman (2014) and Wang et al. (2015) state that the increasing total demand for houses is due to the ageing population. Elderly have moved to a bigger house of higher quality during their middle-aged period, but never moved out to a smaller house, because there is almost no alternative with at least similar quality (Coleman, 2014). Thus, elderly are not always staying in their independent homes voluntarily. Sometimes there is no suitable alternative (Actieagenda Wonen, 2021). Furthermore, De Jong (2021) concludes that elderly prefer to live in rental housing over owner-occupied housing. Altogether, these theories imply an increasing demand for rental houses specially designed for elderly. As stated in 1.1, there is a shortage of these in the Netherlands and therefore elderly cannot move to houses that may be needed at their age.

When looking at the characteristics of the house itself, several researches list aspects that houses should contain to optimize the well-being and health of elderly. Roelofsen (2014) states that the optimal design for a house changes by age. As a consequence of an environment that is not designed for elderly specifically, elderly can experience negative health effects. If houses are designed optimally in terms of light, acoustics, thermal climate and air quality, elderly experience a higher well-being. In addition, designing houses specifically for elderly

may even reduce health defects and diseases (Roelofsen, 2014). De Jong (2021) adds to this that houses should have specific adaptations to help elderly function on a daily basis, by locating all facilities on the same floor.

Also the neighbourhood characteristics play an important role. Szczygiel and Almeida (2017) focus on the effects of the social environment on the satisfaction of life of elderly. They found that elderly living in a social environment experience a higher quality of life. This social environment implies that elderly live in close proximity to other older people in contrast with elderly living independently and alone. In addition, the distance to the nearest facilities play a role in determining the life satisfaction of elderly, since at an older age elderly become less vital and prefer to have them closer by (De Jong, 2021; Holmén & Furukawa, 2002; Steptoe et al., 2015). Also, the diversity of the neighbourhood and the subjective experience of the neighbourhood can influence the life satisfaction (Feng, et al., 2018; Van der Pas et al., 2015).

When looking at the personal level of an elderly person, their health status and household composition are important determinants of their overall life satisfaction. As people become older, their health generally decreases (Steptoe et al., 2015). On average, elderly have more chronic diseases than young people and become less vital. This can affect their overall life satisfaction. In addition, as people get older, their close friends and family may start passing away, causing the feeling of loneliness (Adams et al., 2004). Also partners may pass away, leaving the older person alone in their house (Holmén & Furukawa, 2002). Elderly living alone do more often experience feelings of loneliness. Loneliness affects the mental health of elderly and can therefore affect their overall life satisfaction as well (Adams et al., 2004).

The purpose of many articles is to advise governments for designing housing policies. The challenge of making proper policies is growing due to changing demographical circumstances. Ageing has become a growing trend in developed countries, resulting in changing overall housing demand (Coleman, 2014). Consequently, mismatches with current housing policies start to occur (OECD, 2003). This is also the case in the Netherlands. Based on research and statistics, the Netherlands designed the new 'Actieagenda Wonen' (action-agenda on housing) which contains a set of agreements that the cabinet should use as guideline to solve the housing crisis in the Netherlands (NOS, 2021a; Actieagenda Wonen, 2021). A total of one million houses will be added to the housing stock by 2030 (100.000 per year between 2020 and 2030). The last formed cabinet of December 2021 included the housing challenge for the elderly in its coalition agreement (Kabinetsformatie, 2021).

Based on this literature review, it can be concluded that a substantial amount of information on the topic of housing the elderly can be found. However, what is explicitly missing, is the link between the current housing situation of elderly in the contemporary situation of an ageing population and a shortage of proper housing in the housing market and the effect on their well-being. Following from the literature, four important determinants can be distinguished that may affect the life satisfaction of elderly: the social context (measured in household composition to determine loneliness), the current health status, the characteristics of their current house and the

characteristics of the neighbourhood. This research aims to fill this research gap for the case of the Netherlands, which is a good research case due to the presence of a changing population structure, a shortage of proper housing for elderly and a growing challenge in the health care sector.

1.3 Research problem, aim and questions

As follows from the motivation and academic relevance paragraphs, the fact that a larger share of the population ages has consequences. Due to the shortage of proper housing supply designed for elderly in the Netherlands, in combination with the shortage of medical staff in the health care sector, the current housing situation of elderly may influence the level of life satisfaction of elderly.

The aim of this study is to research the effect of the current housing situation and the effect of the overall life satisfaction of elderly, by taking into account the current health situation, household composition and housing and neighbourhood characteristics.

Central question:

To what extent does the current living situation in terms of health, household and housing, influence the overall life satisfaction of people of 65 and older in the Netherlands?

Sub-questions:

1. What could be theoretical possible aspects of the personal and living circumstances of elderly that may have an effect on their overall perception of well-being?
2. What is the relationship between the overall life satisfaction of elderly and health, household, and housing and neighbourhood characteristics?
3. What do the results of the analysis imply for policy-making on housing elderly in the Netherlands?

Together, the sub-questions create a framework to answer the main question. The first sub-question elaborates the theoretical framework of the quantitative analysis. The second implies the quantitative analysis of the relationship between the health status, household composition, housing characteristics and neighbourhood characteristics and the overall life-satisfaction of people of 65 and older. The third research question aims to set several aspects that are of importance to policy makers in the Netherlands in their approach to solve to problem of housing the elderly.

Question 1 is a theoretical question which aims to elaborate existing literature on the topic. The theories used to answer this question, are theories on healthy ageing, housing demand amongst elderly, housing choices of elderly and what house and neighbourhood characteristics are important to elderly. The major part of this question is answered by journal articles. Sometimes the theories are backed-up by statistics or information from the Dutch government to relate the theories to the Dutch situation. The answer can be found in chapter 2.

Question 2 the analytical research question. Here, the relation between the current living situation of elderly in terms of health status, household composition, housing characteristics and neighbourhood characteristic, and the overall life-satisfaction is measured by linear regressions. For this research question, the WoON-dataset of 2018 is used. The answer can be found in chapter 4. The research methods to come to the final result of chapter 4 can be found in chapter 3.

Question 3 aims to set up a number of factors that could be used in policy making for housing the elderly in the Netherlands. From the analysis of research question 2, the current context for the Netherlands is set and the important influential factors become visible. These form the basis of the policy advise that results from this third research question. The answer can be found in chapter 5.

The sub-questions are translated into the conceptual model (figure 1). Where ‘the overall life satisfaction of people of 65 years old and older’ is the dependent variable, and ‘health status’, ‘household composition’, ‘housing characteristics’ and ‘neighbourhood characteristics’ are the independent, or explanatory, variables.

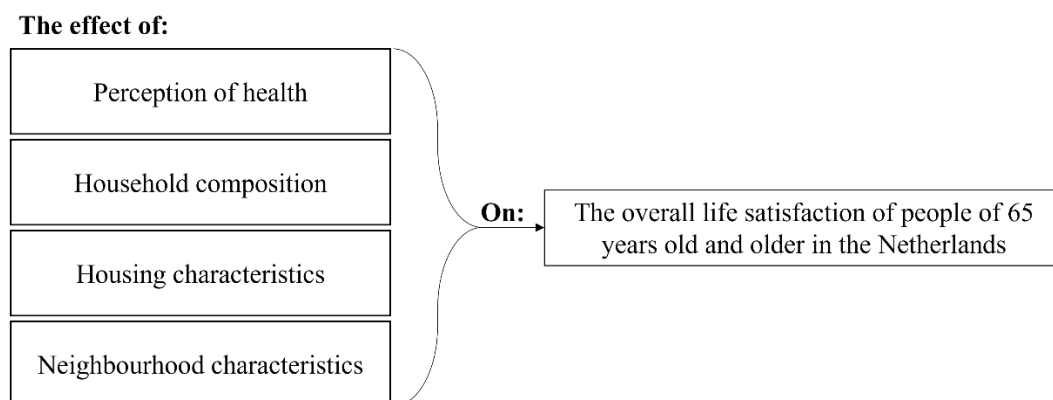


Figure 3: Conceptual model explaining main concepts of this thesis

1.4 Outline

The remainder of this thesis is organized as follows. Chapter 2 describes the theoretical framework that functions as a base for this research. In this chapter, sub-question 1 is answered. The chapter elaborates theories on healthy ageing, housing demand of elderly, optimal living conditions for elderly and the current Dutch policies on housing the elderly. Chapter 3 explains the research methods and provides an overview of the data used. It elaborates on the WoON-dataset of 2018 that is used and the quantitative statistical analysis methods. Chapter 4 contains the results from the data analysis and the discussion of the results, where sub-question 2 is answered. Chapter 5 is the conclusion of this thesis and aims to answer the central research question. In addition, the policy advice and suggestions for future research are presented, which answers sub-question 3.

2. THEORY

This chapter elaborates the theoretical framework of this thesis. It defines the main concepts used and elaborates the existing literature on the relationship between health, household characteristics and the living environment, and the overall life satisfaction of elderly. In addition, this chapter explains the current context in the Netherlands, with respect to policy-making on housing the elderly.

2.1 Health, household and well-being

As can be concluded from the introduction, housing the older generation has become a bigger challenge. The challenge grows in terms of providing housing, but also in terms of health care provision as the group of elderly grows (Actiz, 2020). To prevent misinterpretation, the concepts of 'health' and 'healthy ageing' are defined. The World Health Organization defines the concept of 'health' as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 2019). 'Healthy ageing' refers to a healthy process of becoming older under good circumstances (Rattan, 2013). Also 'well-being' is an important concept in this research. The definition of 'well-being' by the World Health Organization is as follows: "Well-being exists in two dimensions, subjective and objective. It comprises an individual's experience of their life as well as a comparison of life circumstances with social norms and values." (WHO, 2012). For this research, the focus is on the subjective well-being.

Health and subjective well-being are two closely related concepts. The link becomes even more important as people become older (Step toe et al., 2015). The distinction can be made between two types of health: physical health and mental health. The physical health of elderly decreases as they age. People become less vital when they age and the prevalence of chronic diseases increases (Step toe et al., 2015). Elderly need health care services to cure their diseases and disabilities on a daily basis (Holmén & Furukawa, 2002; Step toe et al., 2015). Although the treatment of such diseases has improved the past years, the issue with regard to well-being remains as people still feel sick. The decreasing physical health of elderly can also have consequences for their mental health. Elderly with disabilities tend to live more isolated than those without, because they have become less vital (Holmén & Furukawa, 2002). Along with some aspects of physical health, the mental health of elderly can be disrupted by several other influences. As people become older, more close friends and family start passing away. The grieving that results, the decreasing amount of visits from their friends and family and the decreasing size of their social network affects their feeling of loneliness. The feeling of loneliness could cause depression amongst elderly (Adams et al., 2004). Since the loss of friends and family has negative influences on mental health of elderly, their household composition is an important determinant of their health as well. Elderly that live alone do more often experience feelings of loneliness than elderly living with a partner (Holmén & Furukawa, 2002). Therefore, both the current health situation of elderly and their household composition are important factors in determining their overall life satisfaction. Another important concept to consider when measuring health and well-being is a household's income (Saunders, 1996). When people live below the poverty

line, the chance becomes greater that they are less healthy or unhappy. Therefore, income is included in this research as well.

The link between the health situation of elderly and their housing choices has different aspects. To deal with the decrease of the physical health of elderly, they need health care services to deal with their disabilities. As stated in chapter 1, it is challenging to provide the health care elderly need for their physical health by the health care sector. This is a consequence of both the lack of employees in the sector, and the increased distances that need to be covered to provide elderly health care. However, chapter 1 also points out the possibility to adapt houses to physical disabilities, so elderly can live longer in their current house. As stated above, loneliness is an important determinant of mental health. Thus the surroundings of the house play an important role in determining the well-being of elderly as well from the perspective of mental health. The housing and neighbourhood characteristics that are argued to have a relationship with the well-being of elderly are further explained in section 2.3 and 2.4.

2.2 Housing demand

Elderly behave differently in the housing market than younger generations. The study of Wang et al. (2015) states that housing demand rises as a bigger part of a country's population consists of elderly people. Because of the changing structure in the population, governments must also change housing development plans to include the supply of houses and services for elderly. The research of Coleman (2014) also concludes that overall demand rises as the population grows. More specifically, increasing life-expectancy increases housing demand, since more people need houses for a longer time period as they live longer. Moreover, elderly demand higher quality housing (Coleman, 2014). They moved to a higher quality house during their middle-ages and are less willing to move to a house of lower quality, even though they might not need the space of their current house anymore. Most of the time, there is no suitable alternative to move to. In addition, the demand for the type of housing changes also as people get older (De Jong, 2021). The older people become, the more people prefer to have a rental house instead of an owner-occupied house.

2.3 Housing characteristics

There are many layers behind the reasoning of why elderly choose to live in a certain house. When looking at the physical characteristics of a house, Roelofsen (2014) researched how to optimize the design of housing for elderly to increase their well-being. As the age of a person changes, a person's psyche and cognitive system changes as well. As a consequence, the living environment of a person should contain different elements for that same person to optimize well-being for different ages. In addition, the well-being of elderly is more easily disrupted by errors in the indoor environment, than the well-being of young people. For the physical design of the house, the optimal environment requires adaptations in terms of light, air quality, acoustics and thermal climate (Roelofsen, 2014).

From a more functional perspective, De Jong (2021) elaborates on several functions of their house elderly perceive as important to operate on a daily basis. Elderly prefer to live in a house that is suitable and comfortable for them at their current age. The way daily facilities are installed or located through the house plays a role in making a house suitable for elderly to live in (Safran-Norton, 2010). This can be translated into a single-storey house in which all facilities (i.e. kitchen, living room, bathroom and bedroom) are located on the same floor (De Jong, 2021). Safran-Norton (2010) adds to this the smaller aspects that improve functionality of the house on a daily basis, with installing shower seats, stairs-elevators and grips to help getting up. When reconsidering section 2.2, a substantial number of elderly people are unable to move to a house according to their needs and preferences. This means that many elderly may not have these facilities in their current house, although they might need them. If houses for elderly are not designed according to their age, this results in a lower well-being and more health issues (Roelofsen, 2014).

2.4 Neighbourhood characteristics

In addition to the housing characteristics, the neighbourhood and other elements of the spatial environment surrounding the houses of elderly play a role in determining their life satisfaction. The research of De Jong (2021) aims to understand why elderly choose to live at a certain place. Elderly prefer to live near amenities (i.e. supermarket, pharmacy, health care facilities) in a diverse neighbourhood (De Jong, 2021). Also the feeling of safety in the neighbourhood plays a role in determining the well-being of elderly in the neighbourhood they live in (Feng et al, 2018). In addition, the sense of attachment seems to be important for elderly, as they choose to live at a certain place (Van der Pas et al., 2015).

As a deeper layer of the spatial environment, the social environment of elderly is an important factor of healthy ageing (Holmén & Furukawa, 2002). Research finds evidence for a higher quality of life for elderly living in a community compared to elderly living in independent houses (Szczygiel & Almeida, 2017). People living in care homes or in a community of dwellings designed for elderly, experience lower levels of loneliness, since they live close to other elderly people. When elderly experience feelings of loneliness, this can have serious consequences for their health (Sheikholeslami et al., 2011). Lower levels of loneliness are therefore reflected in a higher overall well-being and a higher quality of life (Szczygiel & Almeida, 2017). Hence, the relationship with the neighbourhood plays an important role for elderly (Feng et al., 2018).

2.5 Current housing policies in the Netherlands

As follows from the reasoning of Wang et al. (2015), Coleman (2014) and De Jong (2021) explained in 2.2, there will probably be a growing demand for smaller, high quality houses in the rental sector for the coming years. The current Dutch housing market has a shortage of this type of housing, and therefore a large amount of elderly do not live in the type of house they prefer to live in (Actieagenda Wonen, 2021). The result for the Netherlands is a high pressure on the housing market, because of a shortage of 330.000 houses in general, but also a shortage of houses that are actually according to the preferences of people in terms of design (NOS,

2021a; NOS, 2021b). In 2021, the ‘Actieagenda Wonen’ (action-plan on housing) was established (Actieagenda Wonen, 2021). By 2030, over one million houses should be added to the Dutch housing stock to solve the problem. Currently, about 71.000 houses are built per year. The government wants to increase this to at least 100.000 per year. The one million new houses are divided into four categories: the free sector (both rental and owner-occupied), social housing (rental), middle-priced rental and owner-occupied until ‘NHG’ (National Mortgage Warranty). By doing so, the middle-segment will receive the largest impulse, to give the younger generation better chances in the housing market.

The Actieagenda Wonen (2021) assumes the fact that elderly living independently until an older age to be one of the drivers behind the housing shortage. Elderly tend not to move, because there is no suitable alternative. Therefore, they stay in a house which should be transferred to the younger generation. As a consequence, elderly live independently more often without getting professional health care. Elderly live in many different places across cities, villages and the countryside. Due to the increasing distances that have to be covered between the independent houses, the home-nurses cannot catch up with the care demand of elderly. Actieagenda Wonen (2021) aims to cover the issues by collaboration with health care organisations whilst providing houses that fulfil the desires of the elderly. By building houses according to the wishes of elderly, they might be willing to give up their single-family home. The recent formation of the new cabinet includes the development of housing for elderly in their coalition agreement (Kabinetsformatie, 2021). A large part of the one million homes will be built for elderly. According to the more specific Actieagenda Wonen (2021), there will be two different types of houses: independent houses in clusters and places in nursing homes. The new houses will be close to each other to help dealing with the challenges health care organizations currently face.

2.6 Hypotheses

Based on the literature framework as established in this chapter, the following hypotheses are stated which are the fundamentals for the statistical analyses that follow. The concepts of ‘well-being’ is summarized in the concept of ‘overall life satisfaction’, which will be used from now on in this research. All hypotheses are in the context of the Netherlands.

Hypothesis 1: There is a positive association between the health status of elderly and the perceived overall life satisfaction.

This first hypothesis follows from the works of Holmén & Furukawa (2002), Adams et al. (2004), Saunders (1996) and Steptoe et al. (2015). As described in 2.1, health is an important factor in measuring the overall life satisfaction of elderly.

Hypothesis 2: There is a negative association between loneliness and the perceived overall life satisfaction.

This second hypothesis follows from the work of Holmén & Furukawa (2002), that explicitly focusses on the effect of elderly living alone or with more persons in their house as explained in 2.1. Here, it is assumed that elderly experience a higher overall life satisfaction when they do not live alone.

Hypothesis 3: There is a positive association between the suitability of the current house of elderly and the perceived overall life satisfaction.

This third hypothesis follows from Roelofsen (2014), Saftan-Northon (2010) and De Jong (2021), which are elaborated in paragraph 2.2 and 2.3. Here, it is assumed that elderly living in houses which are more suitable for them experience a higher overall life satisfaction, for example when it is adapted or designed for elderly.

Hypothesis 4: There is a positive association between the sense of attachment of elderly to their neighbourhood and the overall life satisfaction.

This fourth hypothesis follows from the works of Holmén & Furukawa (2002), Van der Pas et al. (2015), Szczygiel & Almeida (2017), Feng et al. (2018), and De Jong (2021), which are explained in 2.4. It is assumed that the feelings elderly associate with their neighbourhood are important for determining their overall life satisfaction.

Hypothesis 5: There is a negative association between the distance to facilities from the current house of elderly to demanded facilities and the overall life satisfaction.

This fifth hypothesis follows from the work of De Jong (2021), which is explained in 2.4. Here, it is assumed that elderly demand facilities near their current house. Therefore, when distance to facilities grows, the level of overall life satisfaction may decline.

3. DATA & METHODS

This chapter forms the methodological research framework of this thesis. First, the spatial and institutional context of this research is elaborated. Second, the dataset used is described. Third, the operationalisation of the variables is explained. Finally, the methods used for the statistical analysis of the data are elaborated.

3.1 Context

This study is conducted in the context of the Netherlands. As explained in chapter 1 and 2, the Netherlands is coping with three different, though connected, problems: the growth of the elderly population, the shortage of proper housing for elderly and the shortage of medical staff to take care of the elderly. Following from the literature discussed in chapter 2, these three problems in the Netherlands can lead to consequences for the health and well-being of elderly. The Netherlands set up the plan ‘Actieagenda Wonen’ as explained in paragraph 2.6 to cope with the current situation (Actieagenda Wonen, 2021). The new cabinet also perceived the current situation with elderly as problematic and included an approach to solving the problem in its coalition agreement (Kabinetsformatie, 2021). However, before the problems are solved, several years will pass. This research focusses therefore on the current situation in the Netherlands to measure the impacts of the three above mentioned problems, translated into measurable elements based on theory, on the overall life satisfaction of elderly.

3.2 Data

The WoON-dataset is the dataset used to analyse the effects of the problems in the Netherlands, translated into the specific influences that follow from the theory of chapter 2 on the overall life satisfaction of elderly (CBS, 2018). The Dutch Central Office of Statistics (in Dutch: Centraal Bureau Statistiek, CBS) conducts the WoON-research every three years to collect statistical information on the current and desired housing situation of the Dutch population (CBS, 2022). The CBS has been conducting a research on housing preferences since 1981. The WoON as it is now has been conducted since 2006. The sampling for the WoON is from the total Dutch population from the age of 18 being registered in the national Dutch register for persons (in Dutch: Basisregistratie Personen, BRP) (CBS, 2022). The sample is stratified, so all municipalities of the Netherlands are represented. The information collected in the survey is combined with the personal information from the national Dutch register for persons. The survey is conducted by several methods: personal interviews, interviews by phone, and via the Internet. The WoON-dataset used in this research is published in 2018 (CBS, 2018). The total database consists of 922 variables and 67.523 cases. The minimum of respondents is 60.000. The validity refers to whether the measurement instrument actually measures what it is supposed to measure (Punch, 2014). If there occur differences in the composition of population groups over the stratified groups and the total population, the WoON uses a weigh factor based on gender, age, ethnicity and region to make the data comparable and thus valid. The validity of the WoON-data is also assured by analysing the data on plausibility, internal consistency and integrity. Also, the results of the WoON are reliable, because they are consistent over

all the years that the survey has been conducted and therefore comparable (CBS, 2022; Punch, 2014). Also, each WoON-dataset consists of the same minimum respondents. The possible ethical issues are already covered in the dataset, since the dataset is anonymized.

3.3 Operationalisation of the dependent variable

As follows from the research questions in 1.3, this thesis aims to measure the influence of several factors on the dependent variable: the overall life satisfaction of elderly. This is the operationalization of 'well-being' which is mainly used in the theoretical framework. The dependent, or the y-variable, is the variable that a research aims to explain by use of independent variables (Brooks & Tsolacos, 2010). The y-variable is therefore varying based on the input of the x-variables, which are fixed effects on the y-variable. All hypotheses mentioned in 2.6 assume relationships between possible influences, the independent variables, and the overall life satisfaction of elderly, the dependent variable. From the WoON-dataset, the continuous variable called 'Degree of satisfaction with life' is used to measure the overall life satisfaction of the respondents in this research. The respondents could give a grade on a scale from 1 to 10. The descriptive statistics of the dependent variable can be found in table 1. For all ages, the average grade given is 7.803. For the 65- group, this is 7,795 and for the 65+ group, this is 7.821. The 65+ group grades their overall life satisfaction slightly higher than the younger group. For all age groups, the grades given are between 1 and 10.

3.4 Operationalisation of the independent variables

The independent variables are the variables that try to explain the variance of the dependent variable (Brooks & Tsolacos, 2010). For this research, there are four categories of independent variables, which are in line with the hypotheses stated in 2.6. The categories are health, household composition, housing characteristics and neighbourhood characteristics. To determine the optimal operationalization of the independent variables, correlations were explored between the possible independent variables and the dependent variable 'leven' (which is the life satisfaction variable). The categorical variables are transferred into dummy's per category. The continuous variables are included as they appear. The correlation matrix can be found in the appendix. Correlation is measured on a scale from -1 to 0 or 0 to 1, with -1 being strong negative correlation and +1 being strong positive correlation (Brooks & Tsolacos, 2010). However, based on theory, it would be expected that the independent variables would have some correlation with the dependent variable. For the variable on health, the highest (negative) correlations were found. The highest (negative) correlation is found for the category of health being very bad, which has a coefficient of -.2290. All other variables are below (-).2, which indicates that the variables do not have strong correlation coefficients with the dependent variable. The lowest correlation measured is .0029 for age category of 17 to 24. Although the correlation coefficients may not be high, the variables are included in the model because theory argues that these factors are important in explaining the overall life satisfaction of elderly. Furthermore, the problem of multicollinearity could occur when using many independent variables. Multicollinearity means that independent variables correlate with each other (Brooks & Tsolacos, 2010). When independent variables are highly correlated, the estimation of the regression is biased.

Two independent variables are left out based on the correlation matrix due to rather high correlation. First, the household composition is left out due to high correlation with the loneliness variable. This makes sense, since living alone in a household, also gives the answer ‘yes’ to the dummy of loneliness which asks whether one lives alone or not. It actually measures the same. In addition, the variables ‘distance to nearest supermarket’ and ‘distance to nearest other daily shops’ has a high correlation coefficient. This is probably due to the clustering of these types of shops. Therefore, the variable of ‘distance to nearest other daily shops’ is left out the analysis. After the regression, the VIF test is run to check for multicollinearity problems in the regression which cannot directly be observed from the correlation matrix.

To conduct the analysis, some independent variables are cleaned up or transformed. Cleaning up refers to the process of deleting categories that do not add explanatory power to the regression. An example is ‘I don’t know’. Transformation refer to the process of transferring continuous variables into natural logarithms when these variables are not normally distributed. Transferring them into a natural logarithm makes these variables more normally distributed, which causes the regression to perform better. However, the interpretation of the coefficients changes. This cleaning and transformation process is described per variable in the different categories below. Along with the variables that are argued to be included by theory, locational and property specific control variables are included per category if necessary. By including property specific variables on type of house and square meters or floor space, the model controls for differences that may exist in reality. These variables are not kept constant for the respondents as they would be if they were excluded from the model. By not including them in the model, the model assumes that each respondent lives in the same type of house of the same surface. This is not a realistic assumption since houses are a heterogenous good located at different places, and this may disturb the outcomes of the models. The same applies to the type of neighbourhood people live in. The descriptive statistics of the variables are visualised in table 1 and 2 and are referred to in the explanation of each category of independent variables below.

Health status

Health is a general term that can be measured in many ways. Since the dependent variable is based on the opinion of the person itself, the health is measured in the same way. Using this measurement prevents to confuse objective facts and subjective opinions, to obtain valid results. Obtaining valid results refers to measuring what should have been measured (Punch, 2014). By using both subjective perceptions, the same measurement method is used for both variables. In the WoON survey, respondents were asked to choose a category in which they perceived their own health. These categories are as follows: ‘very good’, ‘good’, ‘okay’, ‘sometimes good and sometimes bad’, and ‘bad’. What is remarkable about the descriptive statistics of this variable, is the difference in percentage that choose the ‘very good’ category. For the 65- group, this is about 24%, for the 65+ group, this has decreased to 7%. A bigger share of the 65+ group chooses for the ‘okay’ category or the ‘sometimes good, sometimes bad’ category. This is in line with the theoretical expectations for this variable, since health decreases as people get older. This results in the theoretical expectation that the decreasing health perception of elderly

influences their overall life satisfaction negatively (Steptoe et al., 2015). This expectation is in line with hypothesis 1.

Household composition

According to the literature explained in 2.1, the household composition is an important determinant of the overall life satisfaction of elderly. As elderly age, they are more likely to live alone because close friends and family start to pass away, which could have an impact on their overall life satisfaction (Adams et al., 2004). To operationalize this theoretical possible influence on overall life satisfaction, the variable of ‘number of persons in current household’ is used. This variable consists of five categories: ‘1 person’, ‘2 persons’, ‘3 persons’, ‘4 persons’, and ‘5 or more persons’. Because this research aims to measure the effect of loneliness, the variable is recoded into ‘alone’ and ‘not alone’. When looking at the descriptive statistics, 25% of the 65- group lives alone in their household, compared to 46% of the 65+ group, which is substantially higher. In addition, the household’s income may play a role in the overall life satisfaction of elderly. In the analysis, the gross household income is used as the independent variable for measuring this effect. This variable is continuous and transformed into a natural logarithm to improve the functioning of the regression. Based on theory, the expectation is that elderly living alone experience lower life satisfaction levels than elderly that do not live alone (Holmén & Furukawa, 2002). This expectation is in line with hypothesis 2. When considering income, the expectation is that higher income has a positive effect on the level of overall life satisfaction (Saunders, 1996).

Housing characteristics

As can be concluded from 2.2 and 2.3, the housing characteristics may play a role in determining the overall life satisfaction of elderly. Here, we measure the housing characteristics by using six variables. First, the variable ‘my house is especially designed for elderly’ is used. This (dummy) variable has two answer options: ‘yes’ and ‘no’. For the 65+ group, about 18% lives in a house that is designed for elderly. Second, the variable of the desire to move out of the current house is included, to measure whether elderly want to stay or want to move. This variable consists of 5 categories: ‘Absolutely not’, ‘Maybe’, ‘I would want to but I cannot find a house’, ‘Absolutely yes’ and ‘I already have a new house’. The final category is dropped, since this category does not measure the willingness to move. The other four are used in this research to measure the effect of willingness to move on the overall life satisfaction of elderly. For this variable, 78% of the elderly replied to the category of not wanting to move. Third, the dummy variable ‘owner or renter’ is used, since theory implies this may play a role in the current preferences of elderly. 59% of the elderly is owner of the house they currently live in. Fourth, the dummy variable ‘adaptation for disability’ is included, to measure whether the adaptation of a house to the disability an elderly person may have influences their overall life satisfaction. When comparing the 65- and 65+ groups, the percentage of houses adjusted to a disability increases from 6% to 26%. The amount of houses adjusted to a disability therefore seems to increase as people become older. Furthermore, the type of functional home (consisting of the categories ‘flat/apartment’, ‘terraced house’, ‘semi-detached house’, and ‘detached house’) and the number of square meters of user space are included as two other independent (control)

variables to include the current housing situation of the respondent. For the type of house, it is remarkable that a larger share of the 65+ group lives in a detached house, compared to the 65- group, although their household may be smaller. This finding is in line with context of the Netherlands as explained in chapter 1. The theoretical expectation would be that the more the current housing conditions are according to the preferences and needs of elderly, the higher the overall life satisfaction (Roelofsen, 2014; Saftan-Northon, 2010; De Jong, 2021). Which means that if the house would be designed for elderly, elderly are satisfied with their house and thus do not want to move, people are a renter since theory implies elderly prefer rental houses, and houses are adjusted to a disability if necessary to make the house more suitable. This expectation refers to hypothesis 3.

Neighbourhood characteristics

According to the elaborated theories in 2.4, the neighbourhood characteristics can be of considerable influence on the overall life satisfaction elderly. The neighbourhood characteristics are measured by the following variables. First, the variable 'I do feel at home in this neighbourhood' is used to determine the sense of feeling home in the neighbourhood elderly currently live in. This variable is divided into five categories: 'I totally agree', 'I agree', 'I do not agree nor disagree', 'I disagree', and 'I totally disagree'. 87% of the elderly does agree or totally agree, which means most elderly are quite satisfied with their current neighbourhood at the moment. Second, the distances to facilities are used as independent variables, which are three different variables in the database. These variables are 'the distance to the nearest supermarket', 'the distance to the nearest general practice centre', and 'the distance to the nearest public transport station'. All are measured in meters and respondents could give any answer. Based on the theory elaborated in 2.4, the distance to facilities can be an important determinant of the overall life satisfaction of elderly. These distances are included as natural logarithms, since the original values were right skewed and that may disturb the performance of the regression. The final variable that is included is the 'current housing market category', which consists of the five categories 'urban centre', 'suburban-centre', 'suburban-green', 'village-centre', and 'countryside'. This variable is included as a control variable, to correct for the differences between spatial locations where elderly live, as explained in 3.3. Most elderly seem to live in a neighbourhood which is suburban-centre or village-centre. Based on the theoretical framework, it would be expected that elderly that are satisfied with their neighbourhood experience a higher overall life satisfaction, as is stated in hypothesis 4. In addition, the distance to facilities may a role. As distances increase, elderly may not be able to access the facilities, which would result in a lower overall life satisfaction. This expectation is related to hypothesis 5.

Table 1: Descriptive statistics continuous variables

Variable	Obs			Mean			Std. dev.			Min			Max		
	All ages	65-	65+	All ages	65-	65+	All ages	65-	65+	All ages	65-	65+	All ages	65-	65+
Overall life satisfaction	52,524	35,971	16,553	7.803	7.795	7.821	1.003	1.016	0.975	1	1	1	10	10	10
<i>Household composition</i>															
Log of household's gross income	52,524	35,971	16,553	10.790	10.905	10.540	0.703	0.739	0.540	0	0	3.892	14.240	14.240	14.065
<i>Housing characteristics</i>															
Log total user space (in s.m.)	52,524	35,971	16,553	4.713	4.713	4.712	0.413	0.422	0.393	2.639	2.639	2.708	6.908	6.908	6.908
<i>Neighbourhood characteristics</i>															
Log of distance to nearest large supermarket (in m.)	52,524	35,971	16,553	6.444	6.457	6.415	0.779	0.778	0.781	2.079	2.079	2.708	9.208	9.208	9.100
Log of distance to nearest general practice centre (in m.)	52,524	35,971	16,553	8.509	8.499	8.531	0.796	0.792	0.803	3.970	4.277	3.970	11.162	11.162	11.019
Log of distance to nearest public transport hub (in m.)	52,524	35,971	16,553	8.980	8.950	9.046	0.911	0.924	0.881	3.219	3.219	3.892	11.153	11.153	11.046

Table 2: Descriptive statistics discrete variables

Variable	Freq			Percent			Cum		
	All ages	65-	65+	All ages	65-	65+	All ages	65-	65+
<i>Health</i>									
Perception of health									
Very good	10,064	8,467	1,597	19.16	23.54	6.65	19.16	23.54	6.65
Good	28,871	20,420	8,451	54.97	56.77	51.05	74.13	80.31	60.70
Okay	7,885	4,017	3,868	15.01	11.17	23.37	89.14	91.47	84.07
Sometimes good, sometimes bad	3,850	2,071	1,779	7.33	5.76	10.75	96.47	97.23	94.82
Bad	1,854	996	858	3.53	2.77	5.18	100.00	100.00	100.00

Household composition

Alone in household

Yes	16,680	9,131	7,549	31.76	25.38	45,61	31.76	25.38	45.61
No	35,844	26,840	9,004	68.24	74.62	54,39	100.00	100.00	100.00

Housing characteristics

House designed for elderly

Yes	3,699	795	2,904	7.04	2.21	17.54	7.04	2.21	17.54
No	48,825	35,176	13,649	92.96	97.79	82.46	100.00	100.00	100.00

Desire to move

Absolutely not	35,162	22,330	12,832	66.94	62.08	77.52	66.94	62.08	77.52
Maybe	12,266	9,328	2,938	23.35	25.93	11.75	90.30	88.01	95.27
I would want to, but cannot find a house	1,856	1,472	384	3.53	4.09	2.32	93.83	92.10	97.59
Absolutely yes	3,240	2,841	399	6.17	7.90	2.41	100.00	100.00	100.00

Adjustment to house due to disability

Yes	6,270	2,009	4,261	11.94	5.59	25.74	11.94	5.59	25.74
No	46,254	33,962	12,292	88.06	94.41	74.26	100.00	100.00	100.00

Owner-occupier of the house

Yes	34,365	24,592	9,773	65.43	68.37	59.04	65.43	68.37	59.04
No	18,159	11,379	6,780	34.57	31.63	40.96	100.00	100.00	100.00

Type of house

Flat, apartment	14,118	8,769	5,349	26.88	24.38	32.31	26.88	24.38	32.31
Terraced house	22,785	16,748	6,037	43.38	46.56	36.47	70.26	70.94	68.79
Semi-detached house	7,660	5,401	2,259	14.58	15.01	13.65	84.84	85.95	82.43
Detached house	7,961	5,053	2,908	15.16	14.05	17.57	100.00	100.00	100.00

Neighbourhood characteristics

Feeling at home in neighbourhood

I totally agree	10,933	6,773	4,160	20.82	18.83	25.13	20.82	18.83	25.13
I agree	32,171	21,910	10,261	61.25	60.91	61.99	82.07	79.74	87.12
I do not agree nor disagree	6,536	5,106	1,430	12.44	14.19	8.64	94.51	93.93	95.76

I disagree	2,052	1,557	495	3.91	4.33	2.99	98.42	98.26	98.75
I totally disagree	832	625	207	1.58	1.74	1.25	100.00	100.00	100.00

Housing market neighbourhood type

Urban-Centre	3,262	2,290	972	6.21	6.37	5.87	6.21	6.37	5.87
Suburban-Centre	18,681	13,440	5,241	35.57	37.36	31.66	41.78	43.73	37.53
Suburban-Green	5,941	3,897	2,004	11.31	10.83	12.35	53.09	54.56	49.88
Village-Centre	19,317	12,698	6,619	36.78	35.30	39.99	89.87	89.86	89.87
Countryside	5,323	3,646	1,677	10.13	10.14	10.13	100.00	100.00	100.00

Age

17-24 years old	1,300	1,300	.	2.48	3.61	.	2.48	3.61	.
25-34 years old	6,314	6,314	.	12.02	17.55	.	14.50	21.17	.
35-44 years old	7,439	7,439	.	14.16	20.68	.	28.66	41.85	.
45-54 years old	10,173	10,173	.	19.39	28.28	.	48.03	70.13	.
55-64 years old	10,745	10,745	.	20.46	29.87	.	68.48	100.00	.
65-74 years old	9,676	.	9,676	18.42	.	58.45	86.91	.	58.45
75 years old and older	6,877	.	6,877	13.09	.	41.55	100.00	.	100.00

Note: all 'All ages' variables contain in total 52,524 cases, all '65-' variables contain in total 35,971 cases, and all '65+' variables contain in total 16,553 cases

3.5 Methodology

The analysis consists of four models that measure the influential factors on the overall life satisfaction. The first one includes the age variable in the model for all age categories, the second excludes the age variable for all ages to be able to observe the influence of the age variable on the parameters, the third model only includes respondents being younger than 65 years old, and the fourth only uses the observations of respondents being 65 years and older. For explaining the variance in the grade given to the overall life satisfaction by elderly, a multiple linear regression model is applied. The following conceptual equation is formulated based on the theoretical framework of chapter 2:

$$\text{Overall life satisfaction} = f(\text{Health, Household, Housing, Neighbourhood}) + e \quad \text{eq. 1}$$

This conceptual model can be translated into the following regression equation, based on the before mentioned process of operationalizing the variables of Health, Household, Housing and Neighbourhood. For model 1, the following equation is used:

$$\begin{aligned} L_{ij} = & \beta_0 + \beta_1 AGE_i + \beta_2 HLT_i + \beta_3 LO_i + \beta_4 HHI_i + \beta_5 OO_i + \beta_6 EH_i + \beta_7 DM_i + \beta_8 AD_j + \beta_9 TH_i \\ & + \beta_{10} US_j + \beta_{11} FH_i + \beta_{12} HMN_i + \beta_{13} DS_j + \beta_{14} DG_j + \beta_{15} DP_j + \varepsilon_{ij} \end{aligned} \quad \text{eq. 2}$$

For model 2, 3 and 4, the following equation is used, while accounting for the several age categories as explained in the methodology:

$$\begin{aligned} L_{ij} = & \beta_0 + \beta_1 HLT_i + \beta_2 LO_i + \beta_3 HHI_i + \beta_4 OO_i + \beta_5 EH_i + \beta_6 DM_i + \beta_7 AD_j + \beta_8 TH_i + \beta_9 US_j \\ & + \beta_{10} FH_i + \beta_{11} HMN_i + \beta_{12} DS_j + \beta_{13} DG_j + \beta_{14} DP_j + \varepsilon_{ij} \end{aligned} \quad \text{eq. 3}$$

L denotes the grade of the overall life satisfaction, given by respondent i living in property j . AGE refers to the age category of respondent i . HLT is the subjective perception of health of respondent i . LO denotes the dummy of whether respondent i is living alone or not alone in their household. HHI denotes the household's income of respondent i . OO denotes the dummy of respondent i being an owner-occupier or not. EH denotes the dummy of whether respondent i is living in a house which is designed especially for elderly. DM denotes the desire to move of respondent i . AD denotes the dummy property j being adapted because of a disability. TH denotes the type of house respondent i is living in. US denotes the natural logarithm of the user space of property j . FH denotes the sense of feeling at home in the current neighbourhood of respondent i . HMN denotes the current

housing market neighbourhood type respondent i is living in. DS denotes the distance to the closest large supermarket. DG denotes the distance to the closest general practice centre. DP denotes the distance to the closest public transport hub. ε denotes the error term. β_0 denotes the constant, all other β are parameters to be estimated by multiple linear regression using OLS.

4. RESULTS AND DISCUSSION

4.1 Analysis and robustness checks

Using STATA, the model for multiple linear regression is run as stated in equation 2 and 3. The outcome of the regressions consists of 34 estimated parameters for model 1, and 28 estimated parameters for models 2, 3 and 4 including the constant. Since OLS is used as estimation technique, the assumptions of OLS are checked. There are no problems with VIF, however, the standard errors in the models are heteroskedastic. This problem is solved by running the model with robust standard errors for making inferences in the results section. Model 1 and 2 can be compared to measure the effects of including the age variable in the model. In addition, to check the robustness of the model, a chow test is applied. When running a chow test, the restricted pooled model includes all groups and assumes all groups behave identically over the regression in estimating the parameters using OLS. Then, the pooled model is divided into the different groups that may behave differently in estimating the parameters (Brooks & Tsolacos, 2010). When reconsidering the theoretical framework of chapter 2, many statements are made on changing behaviour as people become older. Therefore, the choice is made to divide the age variable into 65-, which refers to the younger inhabitants of the Netherlands (model 3) and 65+, which refers to the older inhabitants (model 4). Also, the 65+ is the age group of interest in this research as follows from chapter 1. The result of the chow F-test with the dataset split up in these two groups is 18.066, which is significant at a <0.01 significance level. This implies that the two groups have different effects for estimating the parameters in the regression, compared to the pooled model¹ (model 2). Therefore, the models for both age groups should be interpreted separately. When estimating the chow F-test for the 65+ group only, which can be divided into the age group 65-75 and 74+, the chow F-statistic is 1.178, which is insignificant at a <0.01 level. Therefore, the 65+ pooled model (model 4) should be used for making inferences. The four models are shown in table 3 in the results section below.

4.2 Results

Table 3: results for multiple linear regression for overall life satisfaction

	Model 1 (<i>all ages; age var included</i>)	Model 2 (<i>all ages; age var excluded</i>)	Model 3 (<i>age 65-</i>)	Model 4 (<i>age 65+</i>)
Age				
25-34 years	-.100***			
35-44 years	-.180***			
45-54 years	-.206***			
55-64 years	-.120***			
65-74 years	.039			
75 and older	.067**			
<i>(reference category: 17-24 years)</i>				

¹ The chow F-tests are calculated based on models ran without robust standard errors in order to obtain results for the residual sum of squares of the models.

*Health***Perception of health**

Good				
Okay	-.372***	-.359***	-.371***	-.408***
Sometimes good, sometimes bad	-.787***	-.750***	-.793***	-.815***
Bad	-.980***	-.957***	-.953***	-1.052***
(reference category: <i>Very good</i>)	-1.538***	-1.522***	-1.584***	-1.528***

*Household composition***Alone in household**

Yes	-.141***	-.128***	-.180***	-.099***
(reference category: <i>No</i>)				

Log of household's gross income	.115***	.075***	.101***	.084***
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*Housing characteristics***Owner-occupier of the house**

Yes	.022*	.026**	.033**	.004
(reference category: <i>No</i>)				

House designed for elderly

Yes	.047**	.102***	.069*	.021
(reference category: <i>no</i>)				

Desire to move

Maybe	-.143***	-.151***	-.126***	-.158***
I would want to, but cannot find a house	-.340***	-.356***	-.330***	-.336***
Absolutely yes	-.208***	-.224***	-.165***	-.292***
(reference category: <i>Absolutely not</i>)				

Adjustment to house due to disability

Yes	-.047***	.000	-.017	-.066***
(reference category: <i>No</i>)				

Type of house

Terraced house	-.001	-.012	-.014	-.003
Semi-detached house	.005	.002	.004	-.012
Detached house	.028	.035*	.032	.016
(reference category: <i>Flat, apartment</i>)				

Log total user space (in s.m.)	.030**	.054***	.024	0.027
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Neighbourhood characteristics

Feeling at home in neighbourhood

I agree	-.194***	-.205***	-.198***	-.191***
I do not agree nor disagree	-.444***	-.469***	-.438***	-.471***
I disagree	-.528***	-.550***	-.539***	-.511***
I totally disagree	-.697***	-.718***	.730***	-.614***

(reference category: I totally agree)

Housing market neighbourhood type

Urban-Centre	.053**	.064***	.065**	.038
Suburban-Centre	.003	.006	-.003	.010
Suburban-Green	.006	.016	.026	-.031
Village-Centre	-.010	-.002	-.002	-.029

(reference category: Countryside)

Log of distance to nearest large supermarket (in meters)	-.006	-.009	-.008	-.004
Log of distance to nearest general practice centre (in meters)	.002	.001	-.004	.015
Log of distance to nearest public transport hub (in meters)	-.002	-.001	-.001	-.010

Constant	7.279***	7.520***	7.378***	7.679***
Observations	52,524	52,524	35,971	16,553
F	299.85***	357.36***	246.03***	129.14***
R-squared	0.214	.206	.212	.216

Note: *** refers to significance at <0.01 level, ** at <0.05, * at <0.1.

Table 3 presents the regression results for four models. As explained in 4.1, model 1 and 2 are used to see the influence of the variable ‘age’ in the model, and model 3 and 4 are used for making inferences on the hypotheses. Before interpreting the individual coefficients, the fit of the model should be noticed. The R-squared refers to the explained variance in the dependent variable by the independent variables (Moore & McCabe, 2006). For model 3, the R-squared is 21.2%, and for model 4 the R-squared is 21.6%. Furthermore, if the F-statistic of a linear regression is significant, the null hypothesis for the F-test, which is that there is no relationship between the independent and the dependent variables in the model, can be rejected (Moore & McCabe, 2006). Therefore, it can be concluded that the F-statistic for all four models is significant at the <0.01 level. Therefore, all models do indeed have explanatory power over the overall life satisfaction, which is the dependent variable. Consequently, the significant coefficients can be interpreted.

When comparing model 1 and 2, it becomes clear that most of the age categories have significant effects on the overall life satisfaction of people in the Netherlands. When looking at the model fit, the R-squared is almost the same. There are however small changes in the estimated parameters. The first four age categories, with reference to the age category of 17-24 years old, show significant results at a <0.01 level and therefore influence the

overall life satisfaction of people. These categories show negative parameters, which means that overall life perception is lower for people on these four age categories compared to people between 17 and 24. The age category of 65-74 seems not to be significantly different than the 17 to 24 category. However, a positive parameter significant at the <0.05 level for the group of 75 years and older is found. This means that people over 75 experience a higher overall life satisfaction compared to the 17 to 24 group. There seems to be a turning point in the age group of 65-74. When people are younger than 65, their overall life satisfaction is lower compared to the 17-24 group, when people are older than 75, their overall life satisfaction is higher. This is an interesting finding, since the theories which are elaborated in chapter 2 mainly focus on the decreasing overall life satisfaction as people get older and arguing why. A reason for this could be the growing attention paid to the elderly in the Netherlands by the government. The Dutch government has set up several programs aiming at improving the living conditions of elderly (Rijksoverheid, 2022). This special attention paid to elderly may cause this increase of overall life satisfaction which is found in the model. Nevertheless, the problems in the Netherlands on health and housing as explained in chapter 1 remain. Therefore, model 3 and 4 further elaborate on the specific factors which may increase or decrease the overall life satisfaction to gain a better understanding of the situation in the Netherlands. This results in an overview of what important aspects are to focus on in making policies for housing the elderly generation in the Netherlands.

Health

Both model 3 and 4 show significant results at a <0.01 level for all categories of the perception of health, which has a reference category of 'Very good'. The coefficients are negative and become larger as the categories move towards worse health perception. For both groups, 65- and 65+, it can be concluded that, the lower the perception of health, the lower the overall life satisfaction. This conclusion is in line with hypothesis 1, which states a positive relationship between higher health and higher perception of overall life satisfaction. The health status of elderly thus influences the overall life perception of elderly and this is the same as the theoretical expectation.

Household composition

For the household's composition, the main element measured is loneliness. For both model 3 and 4, the coefficient is significant at a <0.01 level, with the reference category of 'no'. The coefficient is negative, and therefore as people live alone in their household, their overall life satisfaction decreases. This corresponds with hypothesis 2, which states that loneliness lowers overall life satisfaction. In addition, the household income is included, which also shows significant coefficients at a <0.01 level. The coefficient is positive, and therefore shows that higher income is associated with a higher life satisfaction. This is in line with the research of Saunders (1996), and is applicable to both the 65- group and the 65+ group.

Housing characteristics

For hypothesis 3 on housing characteristics, model 3 and 4 show evidence for significant results for some variables, however not for all. Hypothesis 3 states that the more suitable a house is for elderly, the higher the

overall life satisfaction will be. Based on the research of De Jong (2021), it can be assumed that elderly prefer a rental house over an owner-occupier house. When considering model 4, the coefficient is insignificant, and therefore the model shows no influence of a house being owner-occupier or rental on the overall life satisfaction of elderly. For the other group, 65-, the variable does indeed have an effect since the coefficient is significant at the 0.05 level. These results are not in line with the hypothesis. It can be concluded that this part of the demand of elderly does not affect their overall life satisfaction, but is only an important determinant in the housing preferences in general (De Jong, 2021). A logical explanation for this result might be found in the trend of the growing amount of elderly that prefer to age in place. Elderly stay at their current home, instead of moving to a rental elderly apartment or care home (Przybula et al., 2020). Consequently, it may be more important to elderly to stay in their current house as long as possible, than the fact whether a house is rental or owner-occupier.

Besides, the variable of 'House designed for elderly' is insignificant for the elderly group. Therefore, this results in no effect on the overall life satisfaction. However, what is peculiar is the significance of the coefficient in model 3 at the <0.1 level. This means that for the group below 65, this may indeed have an effect on the overall life satisfaction. A reason for this could be the inclusion of also the people between 50 and 65, who may also start demanding another type of house. From the age of 50, people find themselves in a transitional phase in which their lifestyle may change parallel with the process of moving towards the older ages. Accordingly, their housing preferences change (Feddersen & Lüdtkke, 2018). Since the transitional phase starts at the age of 50, it might be the case that the demand for a house designed for elderly has been fulfilled before elderly reach the age of 65. Therefore, the effect of living in a house designed for elderly might not have an effect anymore for the age group of 65+, because it might be no longer part of their housing preferences at that age.

The desire to move shows significant results at a <0.01 level for both model 3 and 4. The reference category is 'no', and therefore it can be concluded that, since the coefficients are negative, the overall life satisfaction of people decreases as people do want to move out of their current house. The largest effect is found for the 'I would want to, but cannot find a house'. This could be more frustrating than just having the desire to move, and may therefore affect the overall life satisfaction more. The fact that people cannot find a house according to their demands can be linked to the current pressure on the Dutch housing market, and is therefore no surprising result.

Furthermore, for the adjustment of the house due to a disability, a significant result is found for the 65+ age group. The coefficient found is significant at <0.01 level and negative for the category 'yes', which has 'no' as reference category. Therefore, the overall life satisfaction of people older than 65 decreases as their house is adapted because of a disability, compared to the elderly that do not have these adaptations to their home. This is the opposite to what was expected. The expectation would be that, as houses are more suitable for elderly, which could be achieved by an adaptation, their overall life satisfaction increases. However, the overall life satisfaction decreases instead of increases if a house is adjusted to a disability. This could be explained from the

perspective of elderly, as they may feel unhealthy when their house needs to be adjusted to their disability. Therefore, this variable may have the same effect as the variable on health perception, which is negative on the overall life satisfaction as people feel more unhealthy.

Finally, the property specific variables of type of house and square meters of surface show insignificant results, however remain important to include in the models as control variables to correct for property specific effects. However, what should be noticed about the surface variable, is the significance of the variable in model 1 and 2. The coefficient is significant at <0.05 level in model 1, and at <0.01 level in model 2. However, for making inferences for the hypotheses, these models cannot be used since the chow test on the groups was significant. Although there seems to be an effect when all age categories are included.

From a theoretical perspective as elaborated in chapter 2, the insignificant variables on the housing characteristics in the models should be determinants of housing demand of elderly, which would be reflected in their overall life satisfaction, as they may be aspects that affect the suitability of a house to elderly. However, in these models, not all theoretical elements seem to have the expected effect. According to De Jong (2021), although a lot of research has been done in the past, there is yet no clear answer to which specific type of houses elderly prefer and what therefore should be developed. This enhances the results found here, since these determinants may therefore not be of significant influence on demand, which is assumed to be an influence on the overall life satisfaction.

Neighbourhood characteristics

The variable of 'Feeling at home in neighbourhood' shows significant results for both model 3 and 4. For the elderly model (4), the coefficients are negative and increasing as people disagree more with the statement that they feel at home in their current neighbourhood. This conclusion is in line with the theory elaborated in chapter 2 and supports hypothesis 4. All other neighbourhood variables show insignificant results for model 4.

There is no effect of the current neighbourhood type elderly live in on their overall life satisfaction. This neighbourhood type variable is included as to control for locational effects on the dependent variable, since not all respondents live in the same type of neighbourhood. For model 3, the category of 'Urban-Centre' is significantly different from the reference category 'Countryside', and is positive. This means that people of the 65- experience a positive effect on their overall life satisfaction when they live in this type of neighbourhood. In this case, the inclusion of this control variable is useful, because otherwise this effect would be omitted.

Also, there is no effect of the distance to facilities from their home on the overall life satisfaction of elderly. This contradicts hypothesis 5 and is therefore contrasting with the current literature which assumes that the proximity of facilities increases overall life satisfaction (De Jong, 2021). A reason could be found in the research of Li & Zhao (2021), who find that different contextual factors can influence the well-being of elderly

differently. Therefore, previously researched aspects that may be expected to be significant, may not play a role in certain contexts as seems to be the case for the distances to facilities in the Netherlands. Another reason could be the decreasing dependency of elderly on facilities, since deliver-at-home for any kind of product or health care service has become more popular in the past years (de Kam et al., 2012; Korpela & Holmström, 2019).

4.3 Discussion

Furthermore, there is a general notion to make with regard to the measured health in the regression. Here, no distinction made in the dataset between mental health and physical health. According to Steptoe et al. (2015), the two types of health are determined by different aspects in the current living situation of elderly. These two types of health are divided into mental health and physical health, which are both consisting of different aspects and influences. In the model, health is measured as one phenomenon. Therefore, respondents may view health from both mental and physical perspectives, or maybe one of both. In this research, the division is partly tried to be made by using the personal health perception on the one hand, and the feeling of loneliness on the other hand. Loneliness may refer more to the mental part and health perception more to the physical. However, there is still no clear distinction due to the missing suitable variables in the dataset.

Also, the trend to age-in-place implies that people stay in their current homes instead of moving to a nursing home or elderly community as explained in chapter 1. The downside of this is the growing health care challenge. From the perspective from elderly, as elderly prefer to stay, this may influence their overall life satisfaction positively. Their houses can be adapted to their disabilities to make the house more suitable for them to live in until an older age to lower the demand for health care services. However, this research finds a negative effect to the variable of ‘adaptation to house made for disability’. This sounds counterintuitive, since it would be expected that this would increase the happiness of elderly. As noted, the aspect of being in need of these facilities may be of a larger influence on the overall life satisfaction, in terms of being sick, than the fact that elderly can stay in their house until an older age. Thus, the opinion of elderly on the subject of ‘ageing-in-place’ may also play an important role in determining the other effects on their overall life satisfaction. Therefore, the inclusion of a variable which would represent this opinion and how their current house should be adapted, would make the model more complete. For now, it is hard to make inferences on the effects of both staying in a home and the adaptations to houses. However, the WoON-dataset does not provide this exact information. To partly deal with this problem, the variable on the desire to move was included, to which many elderly replied that they indeed do not want to move. However, only the reasons for the people who indeed do want to move are represented in the dataset. The reasons to stay are unknown. The effect of the reasons to stay might be an important missing explanatory factor in the model to estimate the overall life satisfaction of elderly.

5. CONCLUSION

5.1 Conclusion

This research tries to find evidence for the influential aspects on the overall life satisfaction of elderly in the Netherlands, with regard to their current living conditions in terms of health, household composition, housing characteristics and neighbourhood characteristics. For health perception and household composition, the analysis finds significant influences for the overall life satisfaction of elderly. The lower the current perception of elderly on their health, the lower their overall life satisfaction. Also, when elderly live alone their overall life satisfaction is lower compared to elderly that do not live alone. In addition, the higher the household's income, the higher the overall life satisfaction. Furthermore, for the housing and neighbourhood characteristics, different results are found. With regard to the current housing situation, only the desire to move and the adaptation of the house to a disability do influence overall life satisfaction. For the desire to move, the category referring to people that actually do want to move, but cannot find a house according to their preferences shows the highest negative effect on the overall life satisfaction. When reiterating the current problems in the Dutch housing market, which are expected to grow in the future, more people may end up in this situation and accordingly will experience the same effect on their overall life satisfaction. In addition, when elderly live in a house which is adapted to their disability, they experience a negative effect on their overall life satisfaction. Finally, for the neighbourhood characteristics, only feeling at home in the current neighbourhood influences the overall life satisfaction of elderly. The distances to facilities or type of neighbourhood shows no effect. It can therefore be concluded that the more subjective part of the neighbourhood is more important than the physical design and location of the neighbourhood.

5.2 Policy-making advice

As explained in the introduction, the Netherlands is coping with a growing elderly generation, smaller households and a shortage of housing. As explained in 2.5, the Dutch government has a plan which should lead the decision-making in the housing market in the coming decade (Actieagenda Wonen, 2021; Kabinetsformatie, 2021). Central to the plan with regard to elderly, is building one million new houses for this group. Consequently, it is assumed that elderly will move to these new houses and move out to their bigger houses. These new houses are split up in two types, the independent houses built in clusters and new nursing homes. As a consequence, the distance between these new-built houses is small, which helps to deal with the problem in the health care provision. Based on this research, several points could be added to this plan to optimize higher levels of overall life satisfaction amongst the elderly. Since health is an important factor in determining the overall life satisfaction of elderly, the houses built for elderly must be build according to their health needs, both in terms of physical and mental health. Thus, the design of the house itself as explained in paragraph 2.3 and the location of the house in terms of the possibility to provide health care services play a role. By building the houses in clusters, the proximity of other elderly may increase ones happiness due to a lower feeling of loneliness. Also, the health care challenge decreases. As follows from this research, the neighbourhood plays a

role in determining people's overall life satisfaction. Elderly experience higher levels of overall life satisfaction when they feel more at home in their neighbourhood. To make elderly feel at home, the neighbourhood should be designed according to their needs in terms of social contact and physical safety (Holmén & Furukawa, 2002; Feng et al, 2018). These aspects should thus be included in the policy-making on housing the elderly. In addition, since the demand for housing of elderly is hard to define as also follows from previous literature and the results of this research, the supply of housing should be diverse to offer a suitable house for each household according to their preferences (De Jong, 2021). Furthermore, it must be considered that, although the Actieagenda Wonen (2021) aims to make elderly move towards the new houses, elderly might actually not be willing to move to the new-built houses. As can be seen in the descriptive statistics table, many elderly do not want to move at all.

5.3 Limitations and future research

First, it should be noted that the data used for this research is from 2018. Since the WoON-survey should be conducted once in three years, it may be expected that using the data of 2021 would have been more reliable. However, due to COVID-19, the conduction of the WoON-survey of 2021 was delayed (Rijksoverheid, 2021b). Therefore, the survey used in this research was conducted before the pressure on the Dutch housing market increased during the COVID-19 crisis. The influence of this increased pressure on the Dutch housing market is therefore not included in this research as well as the effects of COVID-19 in general on overall life satisfaction of elderly. The lockdown periods in de COVID-19 pandemic implied isolation of the weaker groups, of which the elderly are an important part of. Elderly may have felt more lonely than they did before. Therefore, the expectation is that social aspects measured in this research would have more effect on the overall life satisfaction. The effect of loneliness would be expected to remain negative but become larger. On the other hand, since elderly did have to stay at home, the effect of the housing characteristics may become larger and preferences may change being more focussed on the home environment, instead of on the neighbourhood and facilities. These facilities may have been closed during the pandemic, or the public transport may not have been safe for them to use. Therefore, these neighbourhood variables may still have no effect on the overall life satisfaction. However, visiting these facilities may become one of the only activities outside their house, and may actually become a significant influence to their overall life satisfaction. Therefore, doing a research on the overall life satisfaction of elderly with the new WoON-dataset would therefore be a suggestion for future research.

Second, this research is limited to the effects the living situation of elderly might have on their overall life satisfaction, since the goal of this research is to elaborate on this part of the overall life satisfaction of elderly. However, in practice there are many aspects that influence the overall life satisfaction of elderly besides the measured elements of their housing situation.

Third, theory implies a division between physical health and mental health being important for measuring the effects on overall life satisfaction. Therefore, it would be advisable to research the effects of both types of health

on the overall life satisfaction in the Netherlands. This could result in a more focused approach in policy-making on housing the elderly, since health in general is an important influence of the government's approaches. Dividing the types of health may result in more specific influences which could be tackled easier in designing the new living environment for elderly.

Finally, as noted in the discussion of the results, the reason to stay might be an important element in determining the overall life satisfaction of elderly. The reason to stay is not included in this research, due to a lack of data on this topic. Ageing-in-place is a growing preference of elderly with regard to their housing conditions. Therefore, future research could do a comparable research to this one, but by including the reasoning of elderly that want to stay to estimate the overall life satisfaction of elderly.

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APPENDIX

Correlation matrix (STATA)

	leven	leeft~24	leeft~34	leeft~44	leeft~54	leeft~64	leeft~74
leven	1.0000						
leeftijd1~24	0.0029	1.0000					
leeftijd2~34	0.0179	-0.0589	1.0000				
leeftijd3~44	0.0038	-0.0647	-0.1502	1.0000			
leeftijd4~54	-0.0198	-0.0781	-0.1812	-0.1991	1.0000		
leeftijd5~64	-0.0135	-0.0808	-0.1875	-0.2060	-0.2486	1.0000	
leeftijd6~74	0.0360	-0.0757	-0.1757	-0.1930	-0.2329	-0.2410	1.0000
leeftijd75~s	-0.0246	-0.0618	-0.1435	-0.1577	-0.1902	-0.1968	-0.1844
verhuisniet	0.1413	-0.1118	-0.1638	-0.0608	0.0038	0.0483	0.0680
verhuisevt	-0.0715	0.0459	0.0715	0.0373	0.0105	-0.0143	-0.0257
verhuiswel	-0.0773	0.1323	0.1593	0.0329	-0.0271	-0.0592	-0.0700
verhuiswil	-0.0954	0.0073	0.0459	0.0267	0.0017	-0.0132	-0.0231
centrumste~k	0.0099	0.0519	0.0587	-0.0104	-0.0259	-0.0220	-0.0024
buitencent~m	-0.0547	0.0434	0.0457	0.0261	-0.0020	-0.0104	-0.0357
groenstede~k	0.0090	0.0019	-0.0211	-0.0094	-0.0007	-0.0005	0.0041
centrumdorps	0.0198	-0.0554	-0.0421	-0.0102	0.0064	0.0059	0.0256
landelijkw~n	0.0376	-0.0239	-0.0299	-0.0070	0.0145	0.0252	0.0134
vhcap	0.0628	0.0416	0.0976	0.1078	0.0999	0.0468	-0.0798
brutohh_r	0.1601	-0.0823	-0.0493	0.0746	0.1587	0.0916	-0.0911
gezondzeer~d	0.2280	0.0856	0.1570	0.0763	0.0167	-0.0530	-0.0933
gezondgoed	0.1001	-0.0191	-0.0171	0.0283	0.0411	0.0179	0.0106
gezondgaat~l	-0.1488	-0.0354	-0.0860	-0.0738	-0.0495	0.0125	0.0603
gezondsoms	-0.1693	-0.0260	-0.0550	-0.0470	-0.0255	0.0175	0.0277
gezondslecht	-0.2290	-0.0258	-0.0444	-0.0298	-0.0146	0.0158	0.0148
loneliness	0.1529	-0.0182	0.0125	0.0975	0.1099	0.0374	-0.0285
oudwon	0.0521	0.0362	0.0841	0.0977	0.1025	0.0540	-0.0702
flat	-0.1125	0.1093	0.1098	-0.0438	-0.1017	-0.0890	-0.0152
rijtjes	-0.0032	-0.0371	0.0123	0.0604	0.0403	0.0216	-0.0316
halfvrij	0.0545	-0.0349	-0.0564	0.0061	0.0305	0.0445	0.0082
vrij	0.0899	-0.0496	-0.0973	-0.0353	0.0399	0.0364	0.0543
buurtHME	0.1551	-0.0352	-0.0612	-0.0326	-0.0181	0.0257	0.0529
buurtME	0.0311	-0.0192	0.0034	0.0084	0.0035	-0.0179	-0.0119
buurtNMENMO	-0.1373	0.0480	0.0396	0.0224	0.0181	0.0026	-0.0356
buurtMO	-0.1086	0.0330	0.0418	0.0134	-0.0041	-0.0170	-0.0129
buurtHMO	-0.0940	0.0112	0.0159	-0.0065	0.0038	0.0056	-0.0115
eenpersoon~n	-0.1529	0.0182	-0.0125	-0.0975	-0.1099	-0.0374	0.0285
paar	0.0965	-0.0409	-0.0536	-0.2037	-0.1871	0.1463	0.2656
anders1pof~r	0.0539	0.0228	0.0654	0.2976	0.2932	-0.1086	-0.2915
gebruiksopp	0.1263	-0.0681	-0.1264	-0.0070	0.0810	0.0636	0.0378
lngebruiks~p	0.1511	-0.1162	-0.1638	0.0013	0.0952	0.0825	0.0534
brutohh_r	0.1601	-0.0823	-0.0493	0.0746	0.1587	0.0916	-0.0911
lnincome	0.1951	-0.1941	-0.0336	0.1125	0.1834	0.1027	-0.0871
vzafstandg~m	0.0436	-0.0404	-0.0470	0.0032	0.0370	0.0366	0.0113
lnafstandg~m	0.0456	-0.0562	-0.0626	0.0106	0.0482	0.0445	0.0157
vzafstandh~t	0.0313	-0.0487	-0.0394	-0.0046	0.0103	0.0219	0.0236
lnafstandh~t	0.0358	-0.0600	-0.0471	-0.0021	0.0170	0.0245	0.0219
vzafstando~v	0.0439	-0.0472	-0.0493	0.0092	0.0390	0.0355	0.0127
lnafstando~v	0.0468	-0.0752	-0.0733	0.0117	0.0490	0.0468	0.0239
vzafstando~t	0.0232	-0.0572	-0.0432	-0.0128	0.0101	0.0188	0.0244
lnafstando~t	0.0277	-0.0857	-0.0722	-0.0100	0.0172	0.0266	0.0364

	leefti~s	verhu~et	verhu~vt	verhu~el	verhu~il	centru~k	buiten~m
leeftijd75~s	1.0000						
verhuisniet	0.1319	1.0000					
verhuisevt	-0.0942	-0.7855	1.0000				
verhuiswel	-0.0655	-0.3649	-0.1415	1.0000			
verhuiswil	-0.0349	-0.2724	-0.1056	-0.0491	1.0000		
centrumste~k	-0.0103	-0.0466	0.0248	0.0367	0.0140	1.0000	
buitencent~m	-0.0351	-0.0739	0.0253	0.0700	0.0390	-0.1912	1.0000
groenstede~k	0.0259	0.0098	-0.0040	-0.0064	-0.0075	-0.0919	-0.2653
centrumdorps	0.0328	0.0621	-0.0206	-0.0654	-0.0258	-0.1963	-0.5667
landelijkw~n	-0.0155	0.0449	-0.0228	-0.0292	-0.0240	-0.0864	-0.2495
vhcap	-0.3060	-0.0991	0.0754	0.0409	0.0263	0.0006	0.0351
brutohh_r	-0.1826	0.0327	0.0081	-0.0537	-0.0318	-0.0086	-0.0732
gezondzeer~d	-0.1186	-0.0374	0.0130	0.0511	-0.0012	0.0397	0.0038
gezondgoed	-0.0857	0.0236	0.0048	-0.0347	-0.0259	-0.0214	-0.0346
gezondgaat~l	0.1493	0.0206	-0.0145	-0.0158	0.0016	-0.0132	0.0103
gezondsoms	0.0907	-0.0115	0.0010	-0.0017	0.0293	-0.0025	0.0225
gezondslecht	0.0668	-0.0075	-0.0139	0.0174	0.0282	0.0021	0.0333
loneliness	-0.2452	0.0239	-0.0074	-0.0252	-0.0112	-0.0698	-0.0704
oudwon	-0.3028	-0.0980	0.0811	0.0359	0.0172	0.0033	0.0144
flat	0.1320	-0.1068	0.0185	0.1339	0.0554	0.2075	0.2260
rijtjes	-0.0940	-0.0029	0.0208	-0.0371	0.0081	-0.0845	0.1007
halfvrij	-0.0342	0.0542	-0.0132	-0.0591	-0.0309	-0.0648	-0.1687
vrij	0.0004	0.0827	-0.0385	-0.0561	-0.0493	-0.0760	-0.2526
buurthME	0.0386	0.1622	-0.1146	-0.0796	-0.0468	0.0212	-0.0652
buurtME	0.0278	0.0904	-0.0247	-0.0756	-0.0753	-0.0146	-0.0100
buurtNMENMO	-0.0668	-0.2097	0.1486	0.0805	0.0890	-0.0026	0.0558
buurtMO	-0.0293	-0.1447	0.0436	0.1415	0.0844	-0.0059	0.0477
buurthMO	-0.0117	-0.1011	0.0085	0.1215	0.0798	0.0040	0.0293
eenpersoon~n	0.2452	-0.0239	0.0074	0.0252	0.0112	0.0698	0.0704
paar	0.0201	0.0515	-0.0160	-0.0499	-0.0296	-0.0160	-0.0707
anders1pof~r	-0.2598	-0.0277	0.0086	0.0249	0.0184	-0.0524	0.0012
gebruiksopp	-0.0539	0.0947	-0.0333	-0.0836	-0.0561	-0.0834	-0.2080
lgebruiks~p	-0.0615	0.1294	-0.0385	-0.1282	-0.0744	-0.1315	-0.2292
brutohh_r	-0.1826	0.0327	0.0081	-0.0537	-0.0318	-0.0086	-0.0732
lnincome	-0.2321	0.0475	0.0116	-0.0863	-0.0352	-0.0410	-0.0889
vzafstandg~m	-0.0395	0.0477	-0.0201	-0.0400	-0.0235	-0.1178	-0.1762
lnafstandg~m	-0.0524	0.0524	-0.0157	-0.0550	-0.0259	-0.1650	-0.1416
vzafstandh~t	-0.0003	0.0647	-0.0239	-0.0598	-0.0322	-0.1478	-0.4168
lnafstandh~t	0.0008	0.0700	-0.0289	-0.0621	-0.0312	-0.1571	-0.3966
vzafstando~v	-0.0429	0.0459	-0.0164	-0.0441	-0.0219	-0.1474	-0.1553
lnafstando~v	-0.0477	0.0578	-0.0141	-0.0657	-0.0294	-0.2505	-0.1159
vzafstando~t	0.0188	0.0619	-0.0213	-0.0604	-0.0303	-0.1101	-0.3251
lnafstando~t	0.0255	0.0799	-0.0300	-0.0792	-0.0317	-0.2070	-0.3437

	groens~k	centru~s	landel~n	vhcap	brutoh~r	ge~rgoed	ge~dgoed
groenstede~k	1.0000						
centrumdorps	-0.2724	1.0000					
landelijkw~n	-0.1199	-0.2561	1.0000				
vhcap	-0.0152	-0.0253	0.0003	1.0000			
brutoh_r	0.0244	0.0277	0.0531	0.1107	1.0000		
gezondzeer~d	0.0024	-0.0270	0.0029	0.0920	0.1096	1.0000	
gezondgoed	-0.0008	0.0306	0.0240	0.0940	0.0709	-0.5379	1.0000
gezondgaat~l	-0.0054	0.0044	-0.0073	-0.0907	-0.1034	-0.2046	-0.4643
gezondsoms	0.0057	-0.0092	-0.0250	-0.1123	-0.1020	-0.1369	-0.3107
gezondslecht	-0.0006	-0.0203	-0.0215	-0.1154	-0.0807	-0.0931	-0.2113
loneliness	-0.0052	0.0680	0.0644	0.1527	0.3483	0.0697	0.0798
oudwon	-0.0114	-0.0212	0.0204	0.3884	0.1533	0.0822	0.0820
flat	-0.0072	-0.2145	-0.1743	-0.1788	-0.2386	-0.0199	-0.0884
rijtjes	-0.0163	0.0442	-0.1456	0.1268	-0.0264	-0.0009	0.0167
halfvrij	0.0415	0.1341	0.0616	0.0533	0.1068	0.0057	0.0443
vrij	-0.0095	0.0721	0.3561	-0.0067	0.2263	0.0202	0.0427
buurthME	0.0150	0.0093	0.0558	-0.0276	0.0452	0.0839	-0.0361
buurtME	-0.0071	0.0274	-0.0089	0.0033	0.0114	-0.0473	0.0632
buurtNMENMO	-0.0013	-0.0307	-0.0360	0.0258	-0.0351	-0.0245	-0.0174
buurtMO	-0.0065	-0.0236	-0.0264	0.0070	-0.0453	-0.0115	-0.0334
buurthMO	-0.0073	-0.0196	-0.0108	-0.0022	-0.0285	-0.0056	-0.0317
eenpersoon~n	0.0052	-0.0680	-0.0644	-0.1527	-0.3483	-0.0697	-0.0798
paar	0.0084	0.0424	0.0484	-0.0216	0.0875	-0.0374	0.0204
anders1pof~r	-0.0134	0.0244	0.0150	0.1708	0.2540	0.1054	0.0578
gebruiksopp	0.0409	0.0865	0.2154	0.0323	0.3757	0.0373	0.0728
lngebruiks~p	0.0526	0.1322	0.2024	0.0559	0.4012	0.0365	0.0900
brutoh_r	0.0244	0.0277	0.0531	0.1107	1.0000	0.1096	0.0709
lnincome	0.0179	0.0556	0.0662	0.1501	0.7733	0.1158	0.1132
vzafstandg~m	0.0015	-0.1089	0.5463	0.0207	0.0971	0.0057	0.0360
lnafstandg~m	0.0467	-0.0392	0.3703	0.0376	0.1232	0.0017	0.0429
vzafstandh~t	-0.2035	0.4414	0.2878	-0.0140	0.0245	-0.0250	0.0389
lnafstandh~t	-0.2150	0.4464	0.2673	-0.0088	0.0438	-0.0272	0.0429
vzafstando~v	0.0121	-0.0862	0.4893	0.0229	0.1018	0.0068	0.0347
lnafstando~v	0.0639	0.0019	0.3141	0.0316	0.1230	-0.0074	0.0454
vzafstando~t	-0.0916	0.2905	0.2357	-0.0347	0.0071	-0.0319	0.0324
lnafstando~t	-0.1368	0.3878	0.2347	-0.0330	0.0326	-0.0424	0.0436

	leefti~s	verhu~et	verhu~vt	verhu~el	verhu~il	centru~k	buiten~m
leeftijd75~s	1.0000						
verhuisniet	0.1319	1.0000					
verhuisevt	-0.0942	-0.7855	1.0000				
verhuiswel	-0.0655	-0.3649	-0.1415	1.0000			
verhuiswil	-0.0349	-0.2724	-0.1056	-0.0491	1.0000		
centrumste~k	-0.0103	-0.0466	0.0248	0.0367	0.0140	1.0000	
buitencent~m	-0.0351	-0.0739	0.0253	0.0700	0.0390	-0.1912	1.0000
groenstede~k	0.0259	0.0098	-0.0040	-0.0064	-0.0075	-0.0919	-0.2653
centrumdorps	0.0328	0.0621	-0.0206	-0.0654	-0.0258	-0.1963	-0.5667
landelijkw~n	-0.0155	0.0449	-0.0228	-0.0292	-0.0240	-0.0864	-0.2495
vhcap	-0.3060	-0.0991	0.0754	0.0409	0.0263	0.0006	0.0351
brutohh_r	-0.1826	0.0327	0.0081	-0.0537	-0.0318	-0.0086	-0.0732
gezondzeer~d	-0.1186	-0.0374	0.0130	0.0511	-0.0012	0.0397	0.0038
gezondgoed	-0.0857	0.0236	0.0048	-0.0347	-0.0259	-0.0214	-0.0346
gezondgaat~l	0.1493	0.0206	-0.0145	-0.0158	0.0016	-0.0132	0.0103
gezondsoms	0.0907	-0.0115	0.0010	-0.0017	0.0293	-0.0025	0.0225
gezondslecht	0.0668	-0.0075	-0.0139	0.0174	0.0282	0.0021	0.0333
loneliness	-0.2452	0.0239	-0.0074	-0.0252	-0.0112	-0.0698	-0.0704
oudwon	-0.3028	-0.0980	0.0811	0.0359	0.0172	0.0033	0.0144
flat	0.1320	-0.1068	0.0185	0.1339	0.0554	0.2075	0.2260
rijtjes	-0.0940	-0.0029	0.0208	-0.0371	0.0081	-0.0845	0.1007
halfvrij	-0.0342	0.0542	-0.0132	-0.0591	-0.0309	-0.0648	-0.1687
vrij	0.0004	0.0827	-0.0385	-0.0561	-0.0493	-0.0760	-0.2526
buurtHME	0.0386	0.1622	-0.1146	-0.0796	-0.0468	0.0212	-0.0652
buurtME	0.0278	0.0904	-0.0247	-0.0756	-0.0753	-0.0146	-0.0100
buurtNMENMO	-0.0668	-0.2097	0.1486	0.0805	0.0890	-0.0026	0.0558
buurtMO	-0.0293	-0.1447	0.0436	0.1415	0.0844	-0.0059	0.0477
buurtHMO	-0.0117	-0.1011	0.0085	0.1215	0.0798	0.0040	0.0293
eenpersoon~n	0.2452	-0.0239	0.0074	0.0252	0.0112	0.0698	0.0704
paar	0.0201	0.0515	-0.0160	-0.0499	-0.0296	-0.0160	-0.0707
anders1pof~r	-0.2598	-0.0277	0.0086	0.0249	0.0184	-0.0524	0.0012
gebruiksopp	-0.0539	0.0947	-0.0333	-0.0836	-0.0561	-0.0834	-0.2080
lngebruiks~p	-0.0615	0.1294	-0.0385	-0.1282	-0.0744	-0.1315	-0.2292
brutohh_r	-0.1826	0.0327	0.0081	-0.0537	-0.0318	-0.0086	-0.0732
lnincome	-0.2321	0.0475	0.0116	-0.0863	-0.0352	-0.0410	-0.0889
vzafstandg~m	-0.0395	0.0477	-0.0201	-0.0400	-0.0235	-0.1178	-0.1762
lnafstandg~m	-0.0524	0.0524	-0.0157	-0.0550	-0.0259	-0.1650	-0.1416
vzafstandh~t	-0.0003	0.0647	-0.0239	-0.0598	-0.0322	-0.1478	-0.4168
lnafstandh~t	0.0008	0.0700	-0.0289	-0.0621	-0.0312	-0.1571	-0.3966
vzafstando~v	-0.0429	0.0459	-0.0164	-0.0441	-0.0219	-0.1474	-0.1553
lnafstando~v	-0.0477	0.0578	-0.0141	-0.0657	-0.0294	-0.2505	-0.1159
vzafstando~t	0.0188	0.0619	-0.0213	-0.0604	-0.0303	-0.1101	-0.3251
lnafstando~t	0.0255	0.0799	-0.0300	-0.0792	-0.0317	-0.2070	-0.3437

	groens~k	centru~s	landel~n	vhcap	brutoh~r	ge~ngoed	ge~dgoed
groenstede~k	1.0000						
centrumdorps	-0.2724	1.0000					
landelijkw~n	-0.1199	-0.2561	1.0000				
vhcap	-0.0152	-0.0253	0.0003	1.0000			
brutoh_r	0.0244	0.0277	0.0531	0.1107	1.0000		
gezondzeer~d	0.0024	-0.0270	0.0029	0.0920	0.1096	1.0000	
gezondgoed	-0.0008	0.0306	0.0240	0.0940	0.0709	-0.5379	1.0000
gezondgaat~l	-0.0054	0.0044	-0.0073	-0.0907	-0.1034	-0.2046	-0.4643
gezondsoms	0.0057	-0.0092	-0.0250	-0.1123	-0.1020	-0.1369	-0.3107
gezondslecht	-0.0006	-0.0203	-0.0215	-0.1154	-0.0807	-0.0931	-0.2113
loneliness	-0.0052	0.0680	0.0644	0.1527	0.3483	0.0697	0.0798
oudwon	-0.0114	-0.0212	0.0204	0.3884	0.1533	0.0822	0.0820
flat	-0.0072	-0.2145	-0.1743	-0.1788	-0.2386	-0.0199	-0.0884
rijtjes	-0.0163	0.0442	-0.1456	0.1268	-0.0264	-0.0009	0.0167
halfvrij	0.0415	0.1341	0.0616	0.0533	0.1068	0.0057	0.0443
vrij	-0.0095	0.0721	0.3561	-0.0067	0.2263	0.0202	0.0427
buurtHME	0.0150	0.0093	0.0558	-0.0276	0.0452	0.0839	-0.0361
buurtME	-0.0071	0.0274	-0.0089	0.0033	0.0114	-0.0473	0.0632
buurtNMENMO	-0.0013	-0.0307	-0.0360	0.0258	-0.0351	-0.0245	-0.0174
buurtMO	-0.0065	-0.0236	-0.0264	0.0070	-0.0453	-0.0115	-0.0334
buurtHMO	-0.0073	-0.0196	-0.0108	-0.0022	-0.0285	-0.0056	-0.0317
eenpersoon~n	0.0052	-0.0680	-0.0644	-0.1527	-0.3483	-0.0697	-0.0798
paar	0.0084	0.0424	0.0484	-0.0216	0.0875	-0.0374	0.0204
anders1pof~r	-0.0134	0.0244	0.0150	0.1708	0.2540	0.1054	0.0578
gebruiksopp	0.0409	0.0865	0.2154	0.0323	0.3757	0.0373	0.0728
Ingebruiks~p	0.0526	0.1322	0.2024	0.0559	0.4012	0.0365	0.0900
brutoh_r	0.0244	0.0277	0.0531	0.1107	1.0000	0.1096	0.0709
lnincome	0.0179	0.0556	0.0662	0.1501	0.7733	0.1158	0.1132
vzafstandg~m	0.0015	-0.1089	0.5463	0.0207	0.0971	0.0057	0.0360
lnafstandg~m	0.0467	-0.0392	0.3703	0.0376	0.1232	0.0017	0.0429
vzafstandh~t	-0.2035	0.4414	0.2878	-0.0140	0.0245	-0.0250	0.0389
lnafstandh~t	-0.2150	0.4464	0.2673	-0.0088	0.0438	-0.0272	0.0429
vzafstando~v	0.0121	-0.0862	0.4893	0.0229	0.1018	0.0068	0.0347
lnafstando~v	0.0639	0.0019	0.3141	0.0316	0.1230	-0.0074	0.0454
vzafstando~t	-0.0916	0.2905	0.2357	-0.0347	0.0071	-0.0319	0.0324
lnafstando~t	-0.1368	0.3878	0.2347	-0.0330	0.0326	-0.0424	0.0436

	gezond~l	gezond~s	gezond~t	loneli~s	oudwon	flat	rijtjes
gezondgaat~l	1.0000						
gezondsoms	-0.1182	1.0000					
gezondslecht	-0.0804	-0.0538	1.0000				
loneliness	-0.0872	-0.0856	-0.0741	1.0000			
oudwon	-0.0939	-0.0959	-0.0792	0.1965	1.0000		
flat	0.0504	0.0786	0.0721	-0.3527	-0.2596	1.0000	
rijtjes	-0.0086	-0.0097	-0.0128	0.1179	0.1261	-0.5307	1.0000
halfvrij	-0.0232	-0.0371	-0.0340	0.1326	0.0758	-0.2505	-0.3617
vrij	-0.0277	-0.0472	-0.0380	0.1426	0.0721	-0.2563	-0.3700
buurtHME	-0.0313	-0.0033	-0.0165	0.0349	0.0007	-0.0678	-0.0368
buurtME	0.0056	-0.0378	-0.0270	0.0016	-0.0060	-0.0280	0.0293
buurtNMENMO	0.0202	0.0281	0.0204	-0.0293	0.0163	0.0661	0.0083
buurtMO	0.0080	0.0394	0.0434	-0.0229	-0.0106	0.0688	-0.0046
buurtHMO	0.0141	0.0228	0.0377	-0.0065	-0.0056	0.0479	-0.0095
eenpersoon~n	0.0872	0.0856	0.0741	-1.0000	-0.1965	0.3527	-0.1179
paar	0.0249	-0.0084	-0.0116	0.4852	0.0173	-0.1160	-0.0308
anders1pof~r	-0.1101	-0.0754	-0.0610	0.4967	0.1751	-0.2300	0.1460
gebruiksopp	-0.0521	-0.0820	-0.0591	0.2670	0.1424	-0.3927	-0.0880
lgebruiks~p	-0.0592	-0.0960	-0.0703	0.3586	0.1877	-0.5416	0.0066
brutohh_r	-0.1034	-0.1020	-0.0807	0.3483	0.1533	-0.2386	-0.0264
lnincome	-0.1275	-0.1381	-0.1102	0.5142	0.2141	-0.3464	0.0337
vzafstandg~m	-0.0214	-0.0301	-0.0253	0.0998	0.0497	-0.2173	-0.0857
lnafstandg~m	-0.0249	-0.0315	-0.0267	0.1333	0.0720	-0.2792	-0.0102
vzafstandh~t	0.0024	-0.0188	-0.0296	0.0903	-0.0028	-0.2531	-0.0219
lnafstandh~t	0.0009	-0.0219	-0.0286	0.1012	0.0011	-0.2587	-0.0112
vzafstando~v	-0.0193	-0.0292	-0.0294	0.1049	0.0497	-0.2265	-0.0496
lnafstando~v	-0.0192	-0.0293	-0.0281	0.1413	0.0595	-0.3049	0.0433
vzafstando~t	0.0060	-0.0090	-0.0183	0.0678	-0.0194	-0.2302	-0.0062
lnafstando~t	0.0056	-0.0110	-0.0224	0.0999	-0.0201	-0.2767	0.0161
	halfvrij	vrij	buurtHME	buurtME	buurtN~O	buurtMO	buurtHMO
halfvrij	1.0000						
vrij	-0.1746	1.0000					
buurtHME	0.0458	0.0896	1.0000				
buurtME	0.0084	-0.0142	-0.6446	1.0000			
buurtNMENMO	-0.0371	-0.0567	-0.1933	-0.4740	1.0000		
buurtMO	-0.0368	-0.0425	-0.1034	-0.2535	-0.0760	1.0000	
buurtHMO	-0.0265	-0.0200	-0.0650	-0.1595	-0.0478	-0.0256	1.0000
eenpersoon~n	-0.1326	-0.1426	-0.0349	-0.0016	0.0293	0.0229	0.0065
paar	0.0728	0.1143	0.0588	-0.0177	-0.0310	-0.0215	-0.0070
anders1pof~r	0.0575	0.0260	-0.0243	0.0191	0.0021	-0.0010	0.0006
gebruiksopp	0.1466	0.4629	0.0875	0.0009	-0.0626	-0.0586	-0.0313
lgebruiks~p	0.2114	0.4523	0.1003	0.0112	-0.0780	-0.0771	-0.0440
brutohh_r	0.1068	0.2263	0.0452	0.0114	-0.0351	-0.0453	-0.0285
lnincome	0.1554	0.2288	0.0503	0.0236	-0.0464	-0.0619	-0.0366
vzafstandg~m	0.0795	0.3088	0.0445	0.0023	-0.0331	-0.0308	-0.0185
lnafstandg~m	0.1009	0.2599	0.0383	0.0049	-0.0272	-0.0341	-0.0188
vzafstandh~t	0.1224	0.2227	0.0285	0.0185	-0.0391	-0.0289	-0.0166
lnafstandh~t	0.1240	0.2132	0.0336	0.0184	-0.0433	-0.0307	-0.0190
vzafstando~v	0.0616	0.2878	0.0392	0.0018	-0.0281	-0.0289	-0.0154
lnafstando~v	0.0892	0.2293	0.0256	0.0100	-0.0217	-0.0289	-0.0199
vzafstando~t	0.0940	0.2006	0.0161	0.0248	-0.0379	-0.0221	-0.0146
lnafstando~t	0.1154	0.2063	0.0161	0.0281	-0.0380	-0.0275	-0.0190

	eenper~n	paar	anders~r	gebrui~p	lgebr~p	brutoh~r	lnincome
eenpersoon~n	1.0000						
paar	-0.4852	1.0000					
anders1pof~r	-0.4967	-0.5179	1.0000				
gebruiksopp	-0.2670	0.1203	0.1418	1.0000			
lgebruiks~p	-0.3586	0.1590	0.1930	0.9036	1.0000		
brutoh_r	-0.3483	0.0875	0.2540	0.3757	0.4012	1.0000	
lnincome	-0.5142	0.1725	0.3319	0.3819	0.4691	0.7733	1.0000
vzafstandg~m	-0.0998	0.0503	0.0477	0.2351	0.2445	0.0971	0.1224
lnafstandg~m	-0.1333	0.0572	0.0737	0.2402	0.2740	0.1232	0.1590
vzafstandh~t	-0.0903	0.0573	0.0315	0.1635	0.1919	0.0245	0.0593
lnafstandh~t	-0.1012	0.0599	0.0396	0.1707	0.2056	0.0438	0.0845
vzafstando~v	-0.1049	0.0485	0.0545	0.2210	0.2364	0.1018	0.1321
lnafstando~v	-0.1413	0.0578	0.0808	0.2224	0.2729	0.1230	0.1680
vzafstando~t	-0.0678	0.0521	0.0146	0.1223	0.1562	0.0071	0.0401
lnafstando~t	-0.0999	0.0663	0.0319	0.1491	0.1964	0.0326	0.0796
	vzafst~m	lnafst~m	vzaf~ost	lnaf~ost	vzafst~v	lnafst~v	vzaf~pst
vzafstandg~m	1.0000						
lnafstandg~m	0.8292	1.0000					
vzafstandh~t	0.2189	0.1702	1.0000				
lnafstandh~t	0.2198	0.1870	0.9014	1.0000			
vzafstando~v	0.6905	0.5988	0.2115	0.2203	1.0000		
lnafstando~v	0.5645	0.6928	0.1854	0.2080	0.8022	1.0000	
vzafstando~t	0.1927	0.1600	0.4932	0.3869	0.2054	0.1907	1.0000
lnafstando~t	0.2105	0.2039	0.5322	0.4866	0.2351	0.2578	0.8819
	lnaf~pst						
lnafstando~t	1.0000						

Do file correlation matrix (STATA)

```
*correlation matrix do-file

log using "C:\Users\gwend\OneDrive\Documenten\Master Real Estate
Studies\Thesis\Stata\correlations.smcl", replace

clear all

cd "C:\Users\gwend\OneDrive\Documenten\Master Real Estate
Studies\Thesis\Data\Woon database"

import spss "WoON2018_e_1.0.sav"

*I want to measure loneliness, therefore maybe recode the number of
persons in a household to 1 or 2ormore.
recode aantalpp5 (1=1 "Alone") (2 3 4 5=2 "Not alone"),
generate(loneliness)
label variable loneliness "Alone or not alone"
tabulate loneliness

*clean srtwon
tabulate srtwon
*the categories 'Boerderij, woning met tuindersbedrijf', 'woning met
aparte winkel, kantoor-, pra..', 'Wooneenheid met gezamenlijk gebruik'
and 'ander soort woning' have few cases. These cases cannot be combined
in a logical way, so they are deleted
drop if (srtwon) == 5
drop if (srtwon) == 6
drop if (srtwon) == 7
drop if (srtwon) == 8

tabulate srtwon
drop if missing(srtwon)

tabulate samhh8
recode samhh8 (1=1 "Eenpersoonshuishouden") (2=2 "Paar") (3 4 5 6 7 8=3
"Anders dan eenpersoonshuishouden of paar"), gen(huishouden3cat)
tabulate huishouden3cat
label variable huishouden3cat "New household composition 3 categories"

gen lnafstandgrsuperm = ln(vzafstandgrsuperm)
gen lnafstandhartspost = ln(vzafstandhartspost)
gen lnafstandovdaglev = ln(vzafstandovdaglev)
gen lnafstandoverstapst = ln(vzafstandoverstapst)

drop if missing(lnafstandgrsuperm)
drop if missing(lnafstandhartspost)
drop if missing(lnafstandovdaglev)
drop if missing(lnafstandoverstapst)

gen lnincome = ln(brutohh_r)
drop if missing(lnincome)
```

```

gen lngebruiksopp = ln(gebruiksopp)
drop if missing(lngebruiksopp)

drop if verhwens == 5

tabulate leeftijd
generate leeftijd17tot24 = leeftijd==1
generate leeftijd25tot34 = leeftijd==2
generate leeftijd35tot44 = leeftijd==3
generate leeftijd45tot54 = leeftijd==4
generate leeftijd55tot64 = leeftijd==5
generate leeftijd65tot74 = leeftijd==6
generate leeftijd75plus = leeftijd==7

tabulate verhwens

generate verhuisniet = verhwens==1
generate verhuisevt = verhwens==2
generate verhuiswil = verhwens==3
generate verhuiswel = verhwens==4

tabulate hwmbrt

generate centrumstedelijk = hwmbrt==1
generate buitencentrum = hwmbrt==2
generate groenstedelijk = hwmbrt==3
generate centrumdorps = hwmbrt==4
generate landelijkwonen = hwmbrt==5

tabulate vhcaps

tabulate gezond

generate gezondzeergoed = gezond==1
generate gezondgoed = gezond==2
generate gezondgaatwel = gezond==3
generate gezondsoms = gezond==4
generate gezondslecht = gezond==5

tabulate srtwon

generate flat = srtwon==1
generate rijtjes = srtwon==2
generate halfvrij = srtwon==3
generate vrij = srtwon==4

tabulate brtthuis

generate buurtHME = brtthuis==1
generate buurtME = brtthuis==2
generate buurtNMENMO = brtthuis==3
generate buurtMO = brtthuis==4
generate buurtHMO = brtthuis==5

tabulate huishouden3cat

```



```
generate eenpersoonshuishouden = huishouden3cat==1
generate paar = huishouden3cat==2
generate anderslpofpaar = huishouden3cat==3

correlate leven leeftijd17tot24 leeftijd25tot34 leeftijd35tot44
leeftijd45tot54 leeftijd55tot64 leeftijd65tot74 leeftijd75plus
verhuisniet verhuisevt verhuisswel verhuisswil centrumstedelijk
buitencentrum groenstedelijk centrumdorps landelijkwonen vhcaps brutohh_r
gezondzeergoed gezondgoed gezondgaatwel gezondsoms gezondslecht
loneliness oudwon flat rijtjes halfvrij vrij buurtHME buurtME buurtNMENMO
buurtMO buurtHMO eenpersoonshuishouden paar anderslpofpaar gebruiksopp
lgebruiksopp brutohh_r lnincome vzafstandgrsuperm lnafstandgrsuperm
vzafstandhartspost lnafstandhartspost vzafstandovdaglev lnafstandovdaglev
vzafstandoverstapst lnafstandoverstapst

log close
translate "C:\Users\gwend\OneDrive\Documenten\Master Real Estate
Studies\Thesis\Stata\correlations.smcl" "correlationsthesis.PDF"
```

Do file descriptive statistics (STATA)

```
log using "C:\Users\gwend\OneDrive\Documenten\Master Real Estate  
Studies\Thesis\Stata\log-file-thesis-final-tables.smcl", replace  
clear all
```

```
cd "C:\Users\gwend\OneDrive\Documenten\Master Real Estate  
Studies\Thesis\Data\Woon database"
```

```
import spss "WoON2018_e_1.0.sav"
```

```
recode aantalpp5 (1=1 "Alone") (2 3 4 5=2 "Not alone"),  
generate(loneliness)  
label variable loneliness "Alone or not alone"
```

```
drop if (srtwon) == 5  
drop if (srtwon) == 6  
drop if (srtwon) == 7  
drop if (srtwon) == 8  
drop if missing(srtwon)
```

```
gen lnafstandgrsuperm = ln(vzafstandgrsuperm)  
gen lnafstandhartspost = ln(vzafstandhartspost)  
gen lnafstandoverstapst = ln(vzafstandoverstapst)
```

```
drop if missing(lnafstandgrsuperm)  
drop if missing(lnafstandhartspost)  
drop if missing(lnafstandoverstapst)
```

```
gen lnincome = ln(brutohh_r)  
drop if missing(lnincome)
```

```
gen lngebruiksopp = ln(gebruiksopp)  
drop if missing(lngebruiksopp)
```

```
tabulate verhwens  
drop if verhwens == 5
```

*use this recode below to generate groups; drop one of the two to obtain
the descriptive statistics tables of the variables; to run for all ages,
do not run the code below:

```
*recode leeftijd (1 2 3 4 5=1 "65-") (6 7=2 "65+"), generate  
(newleeftijd)  
*drop if newleeftijd == 1  
*drop if newleeftijd == 2
```

```
tabulate loneliness  
tabulate leeftijd  
tabulate brtthuis  
tabulate verhwens  
tabulate gezond  
tabulate vhcaps  
tabulate eighuura  
tabulate oudwon  
tabulate srtwon  
tabulate hwmbrt
```

```
summarize leven
summarize lngebruiksopp
summarize lnincome
summarize lnafstandgrsuperm
summarize lnafstandhartspost
summarize lnafstandoverstapst
```

```
log close
translate "C:\Users\gwend\OneDrive\Documenten\Master Real Estate
Studies\Thesis\Stata\log-file-thesis-final-tables.smcl" "Thesisoutput-
finaltables.PDF"
```

Do file regression (STATA)

```
*Thesis do file

log using "C:\Users\gwend\OneDrive\Documenten\Master Real Estate
Studies\Thesis\Stata\log-file-thesis-final.smcl", replace

clear all

cd "C:\Users\gwend\OneDrive\Documenten\Master Real Estate
Studies\Thesis\Data\Woon database"

import spss "WoON2018_e_1.0.sav"

*dependent variable exploring
tabulate leven

*explore the data (independent vars)
tabulate aantalpp5
tabulate leeftijd
tabulate brtthuis
tabulate verhwens
tabulate gezond
tabulate vhcaps
tabulate eighuura
tabulate samhh8
tabulate oudwon
tabulate srtwon
tabulate hwmbrt
summarize gebruiksopp
summarize brutohh_r
summarize vzafstandgrsuperm
summarize vzafstandovdaglev
summarize vzafstandhartspost
summarize vzafstandoverstapst

*to work with linear regression, the dataset must be cleaned. If
variables have too few cases in a category, they must be cleaned.

*I want to measure loneliness, therefore maybe recode the number of
persons in a household to 1 or 2ormore.
recode aantalpp5 (1=1 "Alone") (2 3 4 5=2 "Not alone"),
generate(loneliness)
label variable loneliness "Alone or not alone"
tabulate loneliness

*clean srtwon
tabulate srtwon
*the categories 'Boerderij, woning met tuindersbedrijf', 'woning met
aparte winkel, kantoor-, pra..', 'Wooneenheid met gezamenlijk gebruik'
and 'ander soort woning' have few cases. These cases cannot be combined
in a logical way, so they are deleted
drop if (srtwon) == 5
drop if (srtwon) == 6
drop if (srtwon) == 7
drop if (srtwon) == 8
```

```

tabulate srtwon
drop if missing(srtwon)

*also, the household composition is not having enough cases in all cases.
Therefore, the variable is recategorized into 'Eenpersoonshuishouden',
'Paar', and 'Anders dan eenpersoonshuishouden of paar (Other than a pair
or one-headed household)'
tabulate samhh8
recode samhh8 (1=1 "Eenpersoonshuishouden") (2=2 "Paar") (3=3 "Anders dan
eenpersoonshuishouden of paar"), gen(newhhsam3)
tabulate newhhsam3
label variable newhhsam3 "New household composition (3 categories)"

*check the distances to facilities for normality
histogram vzafstandgrsuperm, frequency normal
*this is right skewed
histogram vzafstandhartspost, frequency normal
*also right skewed
histogram vzafstandovdaglev, frequency normal
*also right skewed
histogram vzafstandoverstapst, frequency normal
*also right skewed

*by generating natural logarithms, the variables become more normally
distributed and are more suitable for a linear regression to work with

gen lnafstandgrsuperm = ln(vzafstandgrsuperm)
gen lnafstandhartspost = ln(vzafstandhartspost)
gen lnafstandovdaglev = ln(vzafstandovdaglev)
gen lnafstandoverstapst = ln(vzafstandoverstapst)

drop if missing(lnafstandgrsuperm)
drop if missing(lnafstandhartspost)
drop if missing(lnafstandovdaglev)
drop if missing(lnafstandoverstapst)

*the same goes for user space and income:
gen lnincome = ln(brutohh_r)
drop if missing(lnincome)

gen lngebruiksopp = ln(gebruiksopp)
drop if missing(lngebruiksopp)

*drop if someone already has a new home, because that category is not
suitable for the regression
tabulate verhwens
drop if verhwens == 5

*check correlation of the variables with the dependent variable and
amongst each other

*insert correlation matrix do file here for correlation matrix

* it becomes visible that the continuous variables which have been
transformed into natural logarithms have higher correlation with the

```

dependen variable after the transformation. Therefore, these are included in the model.

*dont use newhhsam3, since it is highly correlated with aantalpp5 (which is logical)

*dont use lnafstandovdaglev since highly correlated with supermarket

*REGRESSIONS:

*the reference categories are set to a large category which is high or low to obtain the most reliable results.

```
regress leven ib1.leeftijd ib1.gezond ib2.loneliness lnincome  
ib2.eighuura ib2.oudwon ib1.verhwens ib2.vhcap ib1.srtwon lngebruiksopp  
ib1.brthuis ib5.hwmbrt lnafstandgrsuperm lnafstandhartspost  
lnafstandoverstapst
```

regcheck

*there is a heteroskedasticity problem. Therefore run the model using robust standard errors.

*model 1 - including age

```
regress leven ib1.leeftijd ib1.gezond ib2.loneliness lnincome  
ib2.eighuura ib2.oudwon ib1.verhwens ib2.vhcap ib1.srtwon lngebruiksopp  
ib1.brthuis ib5.hwmbrt lnafstandgrsuperm lnafstandhartspost  
lnafstandoverstapst, robust
```

*now, leeftijd (age) is left out to run a chow test to determine whether age matters in the overall life perception of people.

*model 2 - pooled model, assuming all age categories behave the same

```
regress leven ib1.gezond ib2.loneliness lnincome ib2.eighuura ib2.oudwon  
ib1.verhwens ib2.vhcap ib1.srtwon lngebruiksopp ib1.brthuis ib5.hwmbrt  
lnafstandgrsuperm lnafstandhartspost lnafstandoverstapst
```

*to run the two groups, the 'leeftijd' variable is divided into two groups, 65- and 65+.

```
recode leeftijd (1 2 3 4 5=1 "65-") (6 7=2 "65+"), generate (newleeftijd)
```

```
regress leven ib1.gezond ib2.loneliness lnincome ib2.eighuura ib2.oudwon  
ib1.verhwens ib2.vhcap ib1.srtwon lngebruiksopp ib1.brthuis ib5.hwmbrt  
lnafstandgrsuperm lnafstandhartspost lnafstandoverstapst if  
newleeftijd==1
```

```
regress leven ib1.gezond ib2.loneliness lnincome ib2.eighuura ib2.oudwon  
ib1.verhwens ib2.vhcap ib1.srtwon lngebruiksopp ib1.brthuis ib5.hwmbrt  
lnafstandgrsuperm lnafstandhartspost lnafstandoverstapst if  
newleeftijd==2
```

*calculating the chow f-test gives:

```
* Fchow = ((41986,43-(29262,34+12323,17))/(28*2-  
28))/(((29262,34+12323,17)/(52524-(2*28)))
```

```
* = 18,06559
```

* which is significant at the 0,01 level for the critical F-value of between 1,79 and 1,72 (for 28 restrictions and 52468 df) (source: Moore & McCabe, 2006)

*so interpret unrestricted models with robust standard errors:

```

*model 3
regress leven ib1.gezond ib2.loneliness lnincome ib2.eighuura ib2.oudwon
ib1.verhwens ib2.vhcap ib1.srtwon lngebruiksopp ib1.brtthuis ib5.hwmbrt
lnafstandgrsuperm lnafstandhartspost lnafstandoverstapst if
newleeftijd==1, robust

*model 4
regress leven ib1.gezond ib2.loneliness lnincome ib2.eighuura ib2.oudwon
ib1.verhwens ib2.vhcap ib1.srtwon lngebruiksopp ib1.brtthuis ib5.hwmbrt
lnafstandgrsuperm lnafstandhartspost lnafstandoverstapst if
newleeftijd==2, robust

*pooled model with robust standard errors
regress leven ib1.gezond ib2.loneliness lnincome ib2.eighuura ib2.oudwon
ib1.verhwens ib2.vhcap ib1.srtwon lngebruiksopp ib1.brtthuis ib5.hwmbrt
lnafstandgrsuperm lnafstandhartspost lnafstandoverstapst, robust

*descriptive statistics
tabulate loneliness
tabulate brtthuis
tabulate verhwens
tabulate gezond
tabulate vhcap
tabulate eighuura
tabulate oudwon
tabulate srtwon
tabulate hwmbrt

summarize leven
summarize lngebruiksopp
summarize lnincome
summarize lnafstandgrsuperm
summarize lnafstandhartspost
summarize lnafstandoverstapst

tabulate leeftijd
tabulate newleeftijd

*


---


tabulate leeftijd
recode leeftijd (1=1) (2=2) (3=3) (4=4) (5=5) (6=6) (7=7), generate
(leeftijdbackup)

drop if (leeftijd) == 1
drop if (leeftijd) == 2
drop if (leeftijd) == 3
drop if (leeftijd) == 4
drop if (leeftijd) == 5

*f-chow test
regress leven ib1.gezond ib2.loneliness lnincome ib2.eighuura ib2.oudwon
ib1.verhwens ib2.vhcap ib1.srtwon lngebruiksopp ib1.brtthuis ib5.hwmbrt
lnafstandgrsuperm lnafstandhartspost lnafstandoverstapst

```

```
regress leven ib1.gezond ib2.loneliness lnincome ib2.eighuura ib2.oudwon  
ib1.verhwens ib2.vhcap ib1.srtwon lngebruiksopp ib1.brtthuis ib5.hwmbrt  
lnafstandgrsuperm lnafstandhartspost lnafstandoverstapst if leeftijd==6
```

```
regress leven ib1.gezond ib2.loneliness lnincome ib2.eighuura ib2.oudwon  
ib1.verhwens ib2.vhcap ib1.srtwon lngebruiksopp ib1.brtthuis ib5.hwmbrt  
lnafstandgrsuperm lnafstandhartspost lnafstandoverstapst if leeftijd==7
```

*calculating the chow f-test gives:

* $F_{chow} = ((12323,16 - (6687,81 + 5610,77)) / (28 * 2 - 28)) / (((6687,81 + 5610,77) / (16553 - (2 * 28)))$

* = 1,178

* which is insignificant at the 0,01 level for the critical F-value of between 1,79 and 1,72 (for 28 restrictions and 16497 df) (source: Moore & McCabe, 2006)

*so interpret unrestricted models with robust standard errors:

```
regress leven ib1.gezond ib2.loneliness lnincome ib2.eighuura ib2.oudwon  
ib1.verhwens ib2.vhcap ib1.srtwon lngebruiksopp ib1.brtthuis ib5.hwmbrt  
lnafstandgrsuperm lnafstandhartspost lnafstandoverstapst, robust
```

log close

```
translate "C:\Users\gwend\OneDrive\Documenten\Master Real Estate  
Studies\Thesis\Stata\log-file-thesis-final.smcl" "Thesisoutput-final.PDF"
```