Aging in Place in The Netherlands: The Role of the Neighbourhood.

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Celine Staal – S3490564
Supervisor: Samira Ramezani
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Abstract

The population of the Netherlands is aging. The Dutch government therefore has introduced a programme (Langer Thuis) which encourages elderly to remain living independently in their own homes to increase quality of life. It does so by facilitating mainly care and housing. However, the neighbourhood influences quality of life of elderly as well. This study investigates which elements of the neighbourhood matter to elderly, and which influence the intention of aging in place of elderly. Looking at both the built and social environment on the neighbourhood level, six categories of objective conditions of the neighbourhood were defined. In a survey, respondents were asked questions about their satisfaction with these elements, together with their intention of moving or aging in place. The survey was analysed with factor analysis and regression analysis. This study finds that only community support and social cohesion have a significant effect on the desire of elderly to remain living in their current residence. Nonetheless, the societal relevance of incorporating the needs of elderly in neighbourhood planning in the Netherlands is present.

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1. Introduction

1.1. Background

In 2018 the Dutch Ministry of Health, Wellbeing and Sports introduced a program called '*Langer Thuis'* (longer at home) which aims at enabling elderly to stay in their current environment relatively independent with a high quality of life otherwise known as *aging in place* (Tweede Kamer, 2018).

The Dutch government has 'living' as one of the three focus points of the program Langer Thuis. The other two consist of 'proper healthcare at home', and 'informal caregiving and volunteers for health and wellbeing' (Tweede Kamer, 2018). The focus point 'living' is mainly targeted towards adapting homes and inventing new living concepts for elderly.

There are several positive effects associated with aging in place. Elderly experience a sense of attachment, familiarity and identity from their homes and neighbourhood, and moving to a nursing home is associated with a reduced quality of life (Lehning et al., 2015). At the same time, the preserved autonomy and social connectedness that comes with aging is place is often increasing the quality of life (Vanleerberghe et al., 2017). With an aging population in the Netherlands as stated by Van Nimewgen & Van Praag (2012), aging in place is considered a cost-effective solution as it is less expensive than residential care in nursing homes (Lehning et al., 2015; Vanleerberghe et al., 2017).

But aging in place also comes with a set of risks. Necessary services and accommodations such as healthcare and hospitals might be less accessible as opposed to in a nursing home. This can leave a burden on informal caregivers, or on elderly themselves, when there is an absence of informal support. (Vanleerberghe et al., 2017). Vanleerberghe et al. (2017) also mentions the physical aspect of maintaining a household and the many chores it brings, or a house that is unsuitable for elderly. This, next to social disadvantages such as a poor social network and even loneliness, are likely to have a negative effect on quality of life (Vanleerberghe et al., 2017). The importance of the physical environment and neighbourhood increases later in life, partly due to a decrease of mobility, next to the sense of attachment (Lehning et al., 2015). Vanleerberghe et al. (2017) discusses that an unfit neighbourhood is a potential risk of aging in place.

Research has been done on what influences quality of life of the elderly (Gabriel & Bowling, 2004; Pernambuco et al., 2012; Schorr & Khalaila, 2018). Other studies investigate the relationship of built environment with quality of life of the elderly (Brown et al., 2009; Wang & Shepley, 2019). However, these studies focus mostly on the built environment on the single building level or leave out the component of the social environment. A study on the relationship of the built and social environment on the neighbourhood level and quality of life with regards to aging in place has not been done in the Netherlands.

1.2. Objectives and Research Question

If we consider the effect neighbourhoods have on aging in place and quality of life of elderly, it might be a logical step to start planning neighbourhoods with a population in mind that will continue to age (van Nimwegen & van Praag, 2012). Therefore, it is relevant to gain insight in how both the built and social environment affects neighbourhood satisfaction and the intention of continuing to live in that neighbourhood of elderly.

The aim of this research is to investigate how spatial planning on the neighbourhood level can be adapted in the future for an aging population. It does so by investigating what built environmental aspects influence neighbourhood satisfaction among elderly, next to the influence of social attributes of the neighbourhood. In a survey among elderly in the Netherlands this research will explore the relationship between neighbourhood satisfaction and the intention of moving, or, as opposed, aging in place. The research is guided by the main research question: *How does satisfaction with neighbourhood characteristics among elderly in the Netherlands influence the intention of aging in place?*

Next to the main question, particular sub questions are defined as follows:

1) *What characteristics of the neighbourhood determine neighbourhood satisfaction among elderly?*
2) *What is the relationship between neighbourhood satisfaction and intention of aging in place in the Netherlands?*

1.3. Reading Guide

This research paper is divided into six sections. In the first section an overview of the background and research objectives were provided. The central and sub questions can be found here as well. In the second section a theoretical framework is given, in which existing concepts and theories are linked to create a conceptual model. The conceptual model and research questions together form the base for the methodology, which is explained in section three. In section four the results of the research are discussed and lead to the conclusion in section five. The conclusion also reflects on the research and provides recommendations for further research in a discussion section.

2. Theoretical Framework

2.1. Aging in Place

To know how to plan for aging in place, it is important to define the concept first. Schorr & Khalaila (2018) defines it as remaining to live within the community, with some level of independence, as opposed to in residential care. Healthcare can be received from family members or caregivers, but there is no need to move away from the current community. Vanleerberghe et al. (2017) adds the importance of appropriate services and assistance. The main goal of aging in place is to prevent or delay a move to a nursing home, which can be experienced as traumatic (Vanleerberghe et al., 2017). However, the difference between aging in place and being 'stuck in place' is choice, and a desire for independence (Lehning et al., 2015). Lehning et al. (2015) sums four *age friendly characteristics* defined by the US EPA initiative. The four categories consist of 1) Staying active, connected, and engaged, 2) Appropriate housing conditions, neighbourhood access to services and shopping and neighbourhood safety, 3) transportation and mobility and 4) Access to healthy activities. These age friendly characteristics all influence the success of aging in place and are helpful in research regarding quality of life among elderly.

2.2. Neighbourhood Satisfaction

Within the neighbourhood different factors contribute to neighbourhood satisfaction among elderly. Gabriel & Bowling (2004) summarize these as enjoyment of the neighbourhood, good facilities and local services, and good public transport. Pleasant views, walkability, belonging to the community, safety and the state of roads are stated as examples (Gabriel & Bowling, 2004). Walkability is further distinguished as the presence of wide side areas, adequate lighting, even walking surfaces, crosswalks, and pedestrian signals (Wang & Shepley, 2019). These physical components are closely interconnected with the social aspect of safety. Other built environment components that influence quality of life in later adulthood are the presence and form of parks, buildings, ramps, and visually appealing streets (Cao et al., 2020).

The social aspects of the neighbourhood that are found to be related to quality of life are social and community support, neighbourhood safety, and options for transportation (Cao et al., 2020). Options for transportation go hand in hand with the built environment aspect of quality of roads, which are important for the enjoyability of transportation options (Gabriel & Bowling, 2004).

The different aspects of the physical and social environment on the neighbourhood level can be divided into six different categories: walkability, attractiveness and condition, facilities, safety, options for transportation and community support.

2.2.1. Walkability

It has been found that elderly on average have different mobility patterns than other age groups (Distefano et al., 2020). Because of physical fitness restrictions, walkability can be affected. The main barriers according to Distefano et al. (2020) are a low level of perceived safety due to traffic and low streetlight, infrastructure deficiencies dedicated to pedestrians such as lack of continuity or inadequate crossings, and management of the walking spaces regarding obstacles or poor maintenance of pavements. Alves et al. (2020) divides walkability among elderly under urban tissue, urban scene, and safety. With urban tissue is meant the pedestrian surface quality, the existence and width of sidewalks, the number of crosswalks and the existence of obstacles. Distefano et al., 2020 calls suitable sidewalk widths as a priority for elderly neighbourhood walkability. Urban scene refers to the number of trees or vegetation and the existence of urban furniture. The quality of street lighting and diversity of information signs is categorized under safety (Alves et al., 2020). The benefits of walking are encouragement to engage in the social environment of the neighbourhood, but elderly tend to avoid walking when the neighbourhood is seen as restrictive to their mobility (Alidoust et al., 2018), thus making walkability a relevant topic to research in relation to aging in place.

2.2.2. Attractiveness and Condition

Studies have reported a relationship between neighbourhood aesthetics and physical activity, which is known to increase health and quality of life (van Lenthe et al., 2005). Van Lenthe et al. (2005) look at whether the neighbourhood has a high-grade living environment by design, state, and use. Indicators for this are the quality of green facilities and amount of noise and air pollution (Distefano et al., 2020).

Parks and green spaces also get mentioned by de Donder et al. (2012). Greenery influences the attractiveness as well as the age friendliness of the neighbourhood. The cleanliness of streets also plays a role in the attractiveness of the neighbourhood (de Donder et al., 2012).

2.2.3. Facilities

Proximity to physical related activities next to other neighbourhood facilities such as shops and parks increase the likelihood of being active at an older age (van Lenthe et al., 2005). Lee et al. (2014) stresses the importance of availability of food shops as well as sport and recreational facilities. Other categories of facilities relevant to elderly, listed by van Cauwenberg et al. (2018) are a diversity of destinations, commercial services, health and age-care, entertainment, public transport, recreational facilities, and facilities for fitness such as a gym or swimming pool.

2.2.4. Safety

While safety has many overlaps with walkability and attractiveness aspects of the neighbourhood, it can be categorized on its own. Alidoust et al. (2018) makes the distinction between safety from crime and risk of injury. Street lighting gets mentioned by different authors as an important indicator for neighbourhood safety among elderly (Alves et al., 2020; Distefano et al., 2020). Distefano et al. (2020) explains that increasing police supervision has a positive effect on the walkability and safety of a neighbourhood.

2.2.5. Options for Transportation

The quality of life of non-driving elderly tends to be lower due to limited mobility (Rahman et al., 2016). Elderly who drive can easily reach destinations further away from their residence and outside of their neighbourhood. Alternatives for driving are volunteer drivers, shuttle busses, prepaid taxi services or public transport. An important aspect of public transport is that it must be easy to use to eliminate a threshold for elderly.

2.2.6. Community Support

Social support is defined as network of relationships that provide companionship, assistance, and emotional nourishment (Gallagher & Truglio-Londrigan, 2004). Community support is when these relationships have something in common, in this case living in the same neighbourhood. This can consist of family, friends, and acquaintances. Formal support can be provided by community organizations (Gallagher & Truglio-Londrigan, 2004). Chen et al. (2016) provides a set of conditions for community support in the neighbourhood. The people in the neighbourhood can be trusted, are willing to help their neighbours, get along, and share the same values (Chen et al., 2016).

2.3. Conceptual Model

In the conceptual model below (fig 1), the objective neighbourhood conditions that are important to elderly are shown, together with variables for each category. The variables create a guideline for the survey conducted in this research, as further explained in the methodology chapter. The model also shows how neighbourhood conditions determine quality of life, with the perceived situation as an influence on this process (fig. 1).

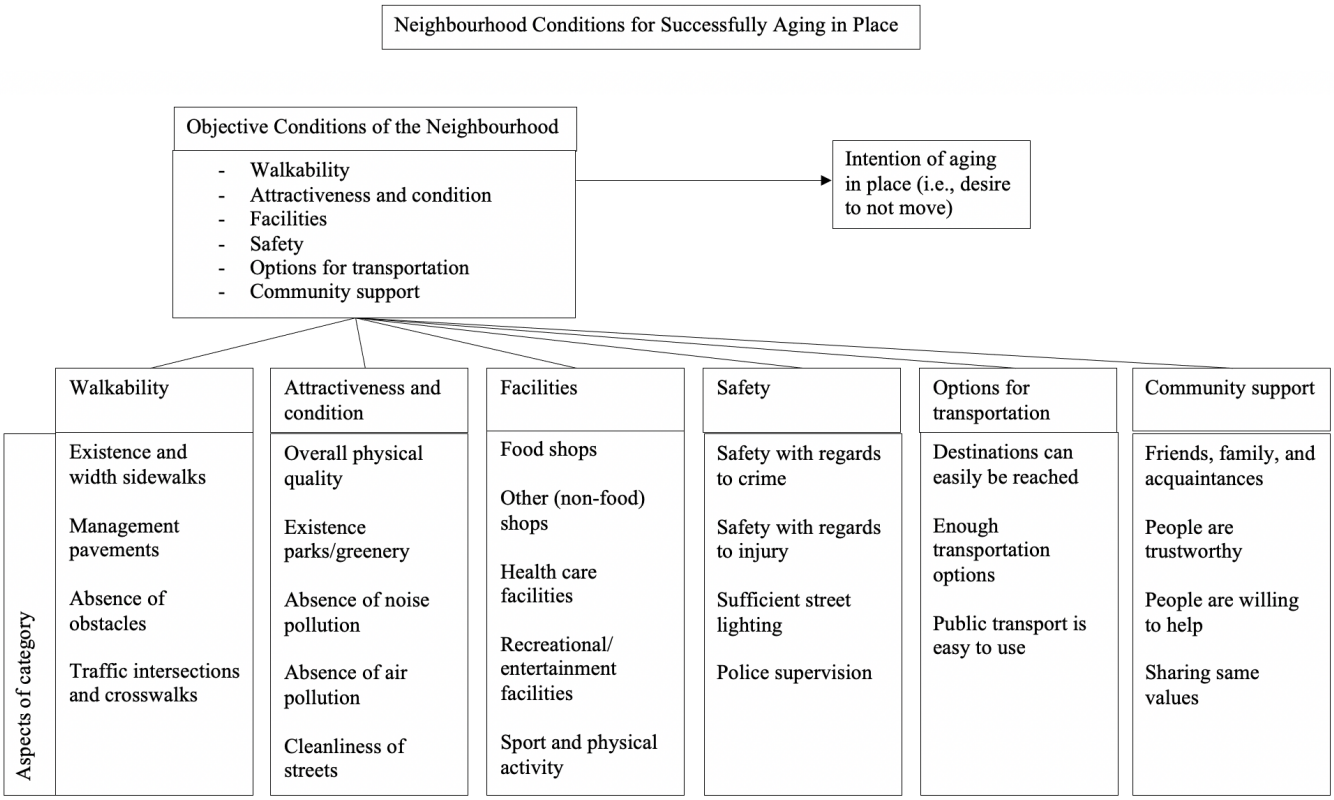

Fig 1. Conceptual model of the study

3. Methodology

3.1. Data Collection

To be able make assumptions about the full population of elderly in the Netherlands, it is important to gather data from a larger and representative sample. Therefore, quantitative methods were used for this research. In combination with literature research, a survey was conducted about neighbourhood satisfaction and intention of aging in place among elderly in the Netherlands. A literature research provides answers for the first sub-question, to specify the elements of the neighbourhood that will be used in primary research. The answer to sub-question 2 is gained through primary research in the form of a survey among elderly in the Netherlands. An overview of the data collection and analysis is given in fig 2.

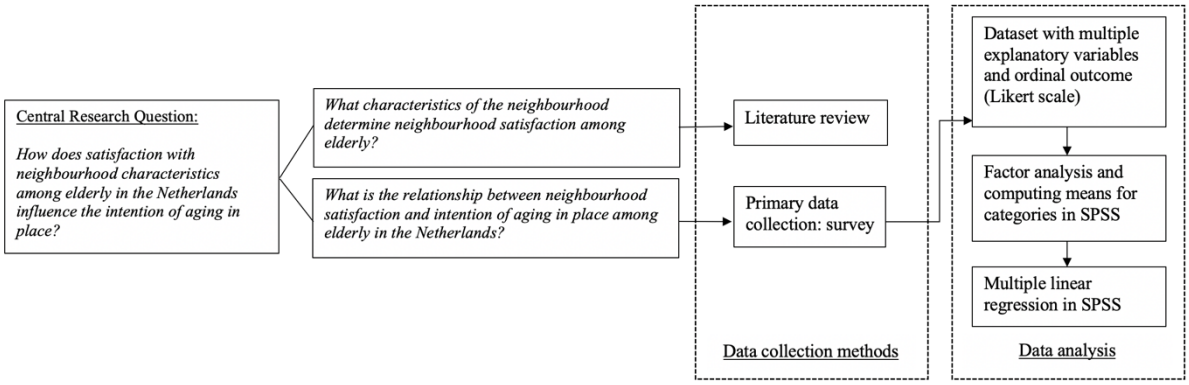

Fig 2. Overview of data collection and analysis

3.1.1. Survey Content

A survey among elderly (ages 65 and up) in the Netherlands was conducted. The survey asked respondents to what extent they agree with statements about their neighbourhood, divided into the following categories, based on literature: *walkability, attractiveness and condition, facilities, safety, options for transportation and community support*. The questions are derived from studies on each category in relation to elderly (fig. 1). The satisfaction of respondents was measured through a Likert scale from 1 (completely disagree) to 5 (completely agree). Afterwards, the respondents were asked about their intention of moving to another residence. This question indicates the likelihood of aging in place, as intention of aging in place is a complex concept and difficult to measure. A more sentimental question was added to determine the feelings respondents have about moving, asking if they experience discomfort from the idea of moving. Lastly, a question about neighbourhood attachment was added to have a first glance at whether the neighbourhood influences moving decisions. A Likert scale from 1 (completely disagree) to 5 (completely agree) is used for these statements as well. Several control variables are added, including age, health, household composition, employment status, health, car ownership and type of living environment (rural/urban). The data collection instrument (questions, answer options and type of data) can be found in appendix 1. The survey resulted in a dataset that can be used through statistical analysis to investigate the influence of satisfaction with neighbourhood characteristics and intention of aging in place. Moreover, the variables are suitable for factor analysis, exploring other relationships and patterns between the variables.

3.1.2. Survey Distribution

The target group of the survey were people aged 65 and older currently living in the Netherlands. A broader research area is selected rather than a case study focussed on a particular city, to increase the chance of receiving many participants. This results in a larger dataset which will be more suitable for statistical analysis. Moreover, the actual neighbourhood of the respondents does not matter for the goal of this research, since it is the *satisfaction* with the neighbourhood that is of interest. Elderly as a target group is one that is often perceived as hard to reach (Kammerer et al., 2019). Their digital skills can be weak or even absent. Nonetheless, with regards to the Covid-19 pandemic, digital is the safer and a more convenient option and the survey was conducted in Qualtrics, an online survey program. Another purpose of this is to simplify the process of transforming given answers into a dataset that is suitable for

usage in SPSS. Distribution of the survey and recruiting participants was therefore a major concern in this research. The survey was distributed through the following methods:

- Social network: the survey was distributed on social media platforms and through acquaintances of the researcher. People were asked to forward the survey to (grand)parents and other acquaintances in the target group.
- Newsletter Koepel Gepensioneerden: on Saturday April 10th, the survey was distributed in the newsletter of retirement institution 'Koepel Gepensioneerden'.
- Ouderenbelangen.nl: The survey was published on the website of ouderenbelangen (elderly interests).

The survey was available for respondents in both Dutch and English. Instructions on the different platform were given in Dutch, as it is the primary language in the Netherlands, and it was expected that English instructions would discourage the target group from filling in the survey.

3.2. Data Analysis

The data that was generated by the survey was analysed through statistical analysis in SPSS. First, a few descriptive statistics and graphs were requested to view the demographics and the general distribution of the data (appendix 2).
For each of the conditions of the neighbourhood (fig. 1), a new variable was created with the mean score of the variables measuring each condition (fig. 3), transforming them from ordinal to ratio data. The new variables will be referred to as the 'mean conditions variables'. For the variables measuring intention of aging in place, a mean variable was computed as well (fig. 3).
The mean conditions variables were analysed in SPSS with a multiple linear regression, with 'Intention of aging in place mean' as the dependent variable and control variables added. From this test, it becomes clear which conditions of the neighbourhood that were predefined by the theoretical framework influence the intention of aging in place.

Q9_1-4	→ Q9 Walkability mean
Q10_1-5	→ Q10 Attractiveness mean
Q11_1-5	→ Q11 Facilities mean
Q12_1-4	→ Q12 Safety mean
Q13_1-3	→ Q13 Transport mean
Q14_1-4	→ Q14 Social cohesion mean
Q15_1-3	→ Q15 Intention of aging in place mean

Fig 3. Overview of computed mean-variables for the conditions of the neighbourhood.

As there might be different correlations between the answers to the questions, a factor analysis was performed with the variables Q9_1 through Q14_4. These variables were chosen for the factor analysis, to be able to see whether factor analysis can confirm the conditions that were defined by the theoretical framework, or it suggests a rearrangement of variables to form different categories. In the case of a possible rearrangement, the same process as for the mean conditions variables would be repeated with the rearranged categories. The outcome of both regression analyses was compared and combined to draw conclusions about the relationship between neighbourhood satisfaction and intention of aging in place.

3.3. Ethical Considerations

When doing research, it is of importance to consider ethical considerations. The nature of this research requests personal data and opinions of respondents. The survey was therefore anonymous: the answers cannot be linked to the respondent. The data of the survey will solely be used for this research and deleted after completion. Cooperating parties such as the Koepel Gepensioneerden and Ouderenbelangen.nl will be able to request the results of the research afterwards.

4. Results

4.1. Respondents and Descriptive Statistics

The survey that was conducted resulted in a dataset with 215 respondents, after filtering out responses that were only partially filled in. Of the respondents, 157 were male, 57 were female and 1 'other' (fig. 4). The age group from 70-74 was most represented with 37% of the respondents (fig. 6). The average age among all the respondents was 74 years. Almost all (210) respondents were retired (fig. 5). When looked at histograms of the Likert scale variables, it can be noticed that most of the graphs have a rather positive skew, except for Q11_4 *(In my neighbourhood there is a sufficient number of recreational/entertainment facilities. (e.g., café's/restaurants, theatre, museums, etc.)*, Q14_1*(Q14_1 Many family members and/or friends of mine live in the same neighbourhood as I do.)*, and Q14_4 *(Q14_4 I often participate in activities/visit places where I meet people living in my neighbourhood (e.g., church, community centre, clubs/associations)* (appendix 2). A possible explanation is that recreational and entertainment facilities are often found on a broader scale than the neighbourhood. The word 'many' in Q14_1 is relative, as there was no boundary set for what can be called few or many. This may have resulted in a higher amount of people disagreeing. For Q14_4, respondents reported either a low amount of participation or moderately high, giving two peaks at 1 (completely disagree) and 4 (somewhat agree) (appendix 2.). This can also be due to the relative nature of the word 'often'.

Q14_1 had a mean response below 2,5, making this variable the only one with a predominantly negative score. Respondents reported a higher satisfaction with the amount of green, the number of shops for food, the amount of street lighting, their safety with regards to injury, their ability to reach destinations out of their neighbourhood, and amount of transportation options. All these variables have an average score of 4,2 or above. Most respondents completely agreed with the statement that they are not planning on moving in the future, however, a lower amount reported experiencing discomfort to the idea of moving. For even less respondents, staying in the same neighbourhood was a condition under which they were willing to move. This outcome suggests that the neighbourhood might not play an important role in the decision to move of elderly.

Gender	*Frequency*	*Percent*
Female	57	26,5
Male	157	73,0

Fig 4. Descriptive statistics of Q3 (what is your gender? *female, male, other*).

Employment status	*Frequency*	*Percent*
Unemployed	1	0,5
Employed	3	1,4
Retired	210	97,7

Fig 5. Descriptive statistics of Q5 (what is your employment status? *Unemployed, employed, retired*).

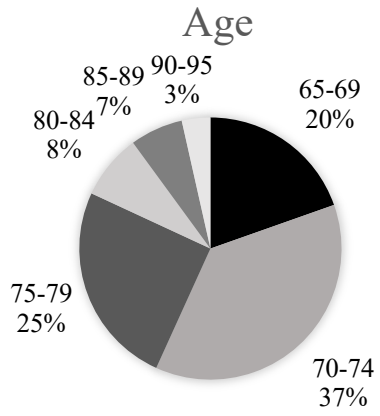

Fig 6. Descriptive statistics of Q1 (what is your age?).

4.2. Regression Analysis with condition means

As explained in the methodology, a multiple linear regression analysis was done with the condition means. The null hypothesis for the test was 'In the Netherlands there is no linear relationship between intention of aging in place on the one hand and walkability, attractiveness and condition, facilities, safety, options for transportation and community support on the other hand'. The confidence interval for this test is 95%. The regression model is significant with a probability value of <.001 (fig. 7). With this model, approximately 19% of the variance is explained, determined from the R-squared value of 0.190. An R-squared value below 0.3 is considered very weak, and this indicates that though an independent variable might be significant, it does not account for much of the mean intention of aging in place.

R	*R square*	*Adjusted R square*
0.436	0.190	0.135

Model	*Sum of Squares*	*Df*	*Sig.*
Regression	28.529	13	**<.001**

Model (neighbourhood conditions)	*Standardized coefficients Beta*	*Sig.*
Q9 Walkability mean	.003	.970
Q10 Attractiveness mean	.087	.315
Q11 Facilities mean	.050	.532
Q12 Safety mean	.020	.836
Q13 Transport mean	.058	.484
Q14 Social cohesion mean	.263	**<.001**

Model (control variables)	*Standardized coefficients Beta*	*Sig.*
Q5 What is your current employment status?	-.137	**.046**
Q6 Do you have health problems?	.142	**.043**

Fig 7. Multiple linear regression with Q15 Intention of aging in place mean as dependent variable and the condition means as independent.

From the control variables, only *Q5 employment status* and *Q6 health* are significant, with a probability value of .046 and .043 respectively (fig. 7). This suggests that respondents that were retired were less likely to agree with the statements about intention of aging in place, and respondents with health issues were more likely to agree with the statements about intention of aging in place.

From the neighbourhood conditions, only the social cohesion mean shows a significant result with a probability value of <.001. The positive standardized beta coefficient suggests that for every point higher on the Likert-scale a respondent rated the statements about social cohesion, that respondent was .263 times more likely to report a higher rate of intention of aging in place. All other neighbourhood conditions are insignificant, meaning there was no relationship between them and the intention of aging in place.

4.3. Factor Analysis

A factor analysis was executed in SPSS with variables Q9_1 through Q14_4, to see which respondent patterns are similar for different variables (appendix 3). From the results a rearrangement of variables into a new set of categories can be suggested (fig. 8). The six rearranged categories are *1) the pedestrian experience, 2) leisure and outgoing, 3) the social environment, 4) health and safety, 5) errands and mobility* and *6) streetscape.* The name of each category is defined by the common ground of the questions. Each category contains multiple stronger variables and a few less significant, yet relevant variables, based on the correlation score in the correlation matrix (appendix 3).

Category	*Stronger variables*	*Weaker variables*
1) The pedestrian experience	Q9_1-4 about walkability, Q10_5 maintenance of streets and public spaces, Q12_3 safety with regards to crime	Q12_2 safety with regards to injury, Q12_1 street lighting, Q12_4 police supervision
2) Leisure and outgoing	Q11_1-5 about facilities	Q13_3 public transport is easy to use
3) The Social environment	Q14_1-4 about community support	Q12_3 safety with regards to crime, Q12_4 police supervision
4) Health and safety	Q10_4 air pollution, Q10_3 noise nuisance, Q12_2 safety with regards to injury, Q12_1 street lighting	Q10_5 maintenance of streets and public spaces
5) Errands and mobility	Q13_1-3 about options for transport	Q11_1 amount of food shops
6) Streetscape	Q10_1 attractiveness urban form, Q10_2 greenery, Q12_4 police supervision	Q10_5 maintenance of streets and public spaces

Fig 8. Rearranged categories from factor analysis with corresponding stronger and weaker variables.

What strikes about the outcome of the factor analysis is that the rearranged categories do to some degree overlap with the predefined conditions from the theoretical framework. The categories *errands and mobility, the social environment,* and *leisure and outgoing,* even show exactly the same variables as for the *options for transport, community support* and *facilities* conditions (fig. 9). If a different outcome of

the regression analysis were to appear with the rearranged categories, it would most likely be in either *the pedestrian experience, streetscape* or *health and safety.* These categories consist of different variables as their similar counterpart conditions from the theoretical framework.

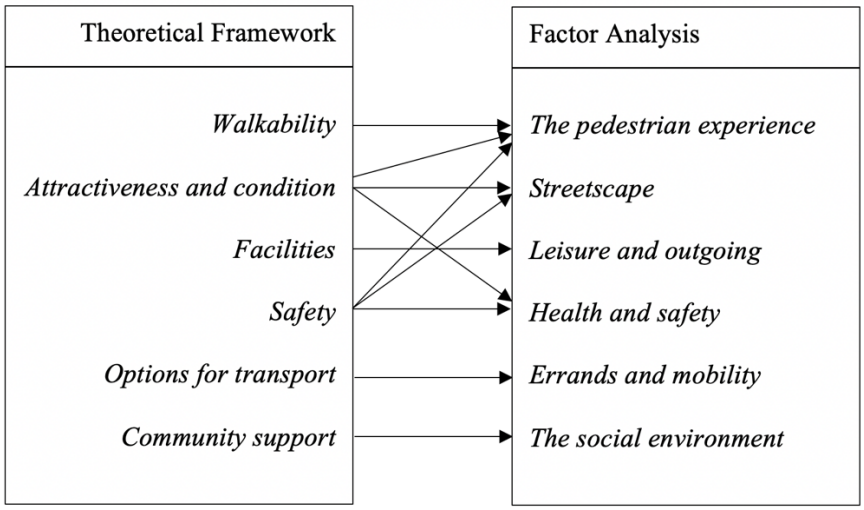

Fig 9. Differences and similarities between categories from the theoretical framework and factor analysis.

4.4. Regression analysis with rearranged categories

To perform multiple linear regression analysis with the intention of aging in place (mean Q15_1-3) as a dependent variable and the categories from the factor analysis as independent variables, new mean variables had to be made. The means were taken from the stronger variables, so every variable only occurs once. A factor score could be used as well, but that could result in different outcomes, and make a comparison between the two regression models more complicated.
For this multiple linear regression, the null hypothesis was 'In the Netherlands there is no linear relationship between intention of aging in place on the one hand and pedestrian experience, social environment, leisure and outgoing, health and safety, errands and mobility and streetscape on the other hand.'. The results from the regression analysis are shown in fig. 13. None of the variables were removed. The regression model is significant with a probability value of <.001 (fig. 10). Therefore, it can be assumed that there is a linear relationship between intention of aging in place and at least one of the independent variables. However, similar to the previous regression analysis, the variance explained is very low at 19,2%.

R	*R square*	*Adjusted R square*
0.483	0.192	0.136

Model	*Sum of Squares*	*Df*	*Sig.*
Regression	28.829	13	**<.001**

Model (rearranged categories)	*Standardized coefficients Beta*	*Sig.*
MEAN pedestrian experience	-.015	.866
MEAN leisure and outgoing	.051	.520
MEAN social environment	.262	**<.001**
MEAN health and safety	.049	.567
MEAN errands and mobility	.057	.484
MEAN streetscape	.086	.311

Model (control variables)	*Standardized coefficients Beta*	*Sig.*
Q5 What is your current employment status?	-.139	**.042**
Q6 Do you have health problems?	.142	**.044**
Q1 What is your age?	.145	**.049**

Fig 10. Multiple linear regression with Q15 Intention of aging in place mean as dependent variable and the categories from the factor analysis as independent. Confidence interval is 95%.

Both control variables about employment status and health are significant again with a respective probability value of .042 and .044 (fig 10). This is a very similar result to the previous regression model. This time, also age is significant with a probability value of .049. Respondents with a higher age were more likely to report a higher intention of aging in place.

Despite the rearrangement of variables, the of the regression analysis shows no new significant models. Like the previous regression analysis, only one of the neighbourhood aspects is significant. The mean social environment is significant with a <.001 probability value and a standardized beta coefficient of .262. As stated in fig. 15, this variable is an exact copy of the social cohesion mean in the previous model. Therefore, it is not surprising to observe a similar result in this model.

5. Conclusion and discussion

The results show that from the set of neighbourhood condition means, only social cohesion has a significant effect on intention of aging in place. Furthermore, control variables employment status and health influence the intention of aging in place as well. A factor analysis suggests a modest rearrangement of variables to identify new categories. A regression analysis with the means of these rearranged categories confirms the previous result, showing no new significant models. This time age is a significant control variable as well, next to employment status and health.

From this study, it may be concluded that there is no evidence that walkability, attractiveness and condition, facilities, safety, and options for transport have an effect on the desire of elderly to remain living in their current residence. However, the more community support and social cohesion elderly experience, the higher this desire gets, intention of aging in place gets increased. This supports the theory by Lehning et al. (2015) that staying active, connected, and engaged are essential conditions for aging in place. However, it must be mentioned that despite significant results, community support and social cohesion account for a very small amount of the variance of intention of aging in place. This is not uncommon in social sciences, as human behaviour is complex, and many factors might play a role in decisions about aging in place. Additionally, the role of perception must be acknowledged when examining opinions and satisfaction (Perez et al., 2001). The results of this study need to be put into perspective, but when this is done, it does add to existing knowledge about neighbourhood satisfaction and aging in place among elderly.

Furthermore, this study suggests the theory that one of the dangers of encouraging aging in place by the government is loneliness among elderly, as a lack of community support and social cohesion does decrease the desire and intention to age in place. The line between aging in place and being ‘stuck in place’ is easily crossed when there is a perceived lack of community support and social cohesion in a neighbourhood. To be aware of dangers means an opportunity to neutralize these dangers, or even transform them into advantages. The knowledge that community support and social cohesion increases intention of aging in place provides a base for policy recommendations and adaptations in the future.

Given the context of this research, executed in a timeframe of one semester as a bachelor thesis, the time and resources were limited. In ideal circumstances, this research would have put more time and money towards distributing the survey. Although having plenty of responses to successfully test the data and find results, in a population of over three million elderlies in the Netherlands chances are a large portion of the population will not be represented by this dataset. Another explanation for a lack of representation is the use of a volunteer-based sample, which is a non-probability sampling method, as opposed to a random or probability sampling method. The Covid-19 pandemic has also limited options for sampling and the distribution of the survey.

Within the research method, after factor analysis it was chosen to use the means of variables instead of the factor score in the regression analysis, to be able to compare it to the other performed regression. A different research can determine if using a factor score for regression analysis in this case will result in similar outcomes.

This study finds social cohesion as the only component of neighbourhood satisfaction that impacts elderly’s decision whether to remain living in their current neighbourhood. The research does not measure which neighbourhood characteristics cause elderly move towards a certain neighbourhood primarily. Future research can be done in the field of pull factors for elderly on the neighbourhood level, to gain more insight in moving decisions based on the neighbourhood.

The findings of this research do however not oppose the theory that for elderly, the neighbourhood matters as well. Returning to the background of this research, the goal of the Langer Thuis program is to increase quality of life of Dutch elderly, by facilitating aging in place. It is known that neighbourhood satisfaction influences quality of life (Boggartz, 2016). The planning of neighbourhoods is a multi-level

governance issue, making it a relevant topic to include in the Langer Thuis program under the focus point ‘living’, next to housing. Along these lines, planning policies in the Netherlands will be directed towards elderly inclusivity, taking needs and wishes of this age group into account. Elderly inclusive neighbourhood planning means adapting now, so neighbourhoods can be a sustainable environment for current and future generations.

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Appendices

Appendix 1: Data Collection Instrument

Question	Answer options	Type of data
Personal/control variables		
Q1 What is your age?	Age in years (>65)	Ratio
Q2 What is the composition of your household?	One-person household, two-person household, family household	Nominal
Q3 What is your gender	Female, male, other	Nominal
Q4 For how long have you been living in your current neighbourhood (address changes not included)?	Less than a year, 1-5 years, 5-10 years, 10-25 years, >25 years	Ordinal
Q5 What is your employment status?	Unemployed, employed, retired	Nominal
Q6 Do you have health issues?	Yes, no	Binary
Q7 What is your type of living environment?	Rural, small village/town, suburban, urban	Nominal
Built environment: walkability		
To what extent do you agree with the following statements?		
Q9_1 In my neighbourhood there is a sufficient number of sidewalks which are wide enough.	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Q9_2 The sidewalks in my neighbourhood are well-maintained.	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Q9_3 There are (almost) no obstacles on the sidewalks in my neighbourhood. (e.g., Parked cars, fences, trees, stairs, etc.)	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Q9_4 In my neighbourhood there is a sufficient number of crosswalks.	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Built environment: attractiveness and condition		
To what extent do you agree with the following statements?		
Q10_1 My neighbourhood is attractive to look at (e.g., Architecture, urban form)	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Q10_2 There is a sufficient amount of parks/greenery in my neighbourhood.	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Q10_3 I experience (almost) no noise nuisance in my neighbourhood.	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Q10_4 experience (almost) no air pollution in my neighbourhood.	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal

Q10_5 The streets and other public spaces in my neighbourhood are clean and well-maintained.	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Built environment: facilities		
To what extent do you agree with the following statements?		
Q11_1 In my neighbourhood there is a sufficient amount of food shops. (e.g., grocery store, bakery, butcher, etc.)	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Q11_2 In my neighbourhood there is a sufficient amount of non-food shops. (e.g., drugstore, clothing shop, department store, etc.)	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Q11_3 In my neighbourhood there is a sufficient number of health-care facilities. (e.g., pharmacy, doctor's office, dentist, etc.)	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Q11_4 In my neighbourhood there is a sufficient number of recreational/entertainment facilities. (e.g., café's/restaurants, theatre, museums, etc.)	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Q11_5 In my neighbourhood there is a sufficient number of facilities for sport/physical activity. (e.g., bicycle lane, gym, swimming pool)	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Social environment: safety		
To what extent do you agree with the following statements?		
Q12_1 There is a sufficient amount of street lighting in my neighbourhood.	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Q12_2 In my neighbourhood, I feel safe from injury. (falling, accidents)	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Q12_3 In my neighbourhood, I feel safe from crime.	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Q12_4 There is sufficient amount of police supervision in my neighbourhood.	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Social environment: options for transportation		
To what extent do you agree with the following statements?		
Q13_1 I can reach destinations out of my neighbourhood easily.	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal

Q13_2 I am satisfied with the amount of transportation options I have in my neighbourhood.	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Q13_3 The public transport in my neighbourhood is good and easy to use.	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Social environment: community support		
To what extent do you agree with the following statements?		
Q14_1 Many family members and/or friends of mine live in the same neighbourhood as I do.	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Q14_2 People in my neighbourhood can be trusted and are willing to help their neighbours.	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Q14_3 I am part of the local community in my neighbourhood.	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Q14_4 I often participate in activities/visit places where I meet people living in my neighbourhood (e.g., church, community centre, clubs/associations)	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Intention of aging in place		
To what extent do you agree with the following statements?		
Q15_1 I have no intention of moving to another residence in the future.	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Q15_2 The thought of possibly having to move brings me discomfort.	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal
Q15_3 I am willing to move in the future, if necessary, provided that it is in the same neighbourhood.	Completely disagree, somewhat disagree, neutral, somewhat agree, completely agree.	Ordinal

Appendix 2: Descriptive Statistics.

Statistics

		Q1 Wat is uw leeftijd?	Q3 Wat is uw geslacht?	Q6 Heeft u gezondheids problemen?	Q2 Hoe is uw huishouden opgesteld?	Q4 Hoe lang woont u al in uw huidige wijk (adreswijziging niet meegeteld)?	Q5 Wat is uw huidige arbeidsstatus?	Q7 In welk type leefomgeving woont u?	Q9_1 In hoeverre bent u het eens met de volgende stellingen? – Er zijn voldoende stoepen in mijn wijk die wijd genoeg zijn.	Q9_2 In hoeverre bent u het eens met de volgende stellingen? – De stoepen in mijn wijk zijn goed onderhouden.	Q9_3In hoeverre bent u het eens met de volgende stellingen? – Er zijn (bijna) geen obstakels op de stoepen in mijn wijk. (bijv. geparkeerde auto's, hekken, bomen, trappen, etc.)	Q9_4 In hoeverre bent u het eens met de volgende stellingen? – Er zijn voldoende zebrapaden en oversteekplekken in mijn wijk.	Q10_1 In hoeverre bent u het eens met de volgende stellingen? – Mijn wijk is aantrekkelijk om te zien. (bijv. architectuur en stedelijke vorm)	Q10_2 In hoeverre bent u het eens met de volgende stellingen? – Er zijn voldoende groenvoorzieningen/parken in mijn wijk.	Q10_3 In hoeverre bent u het eens met de volgende stellingen? – Ik ervaar nauwelijks geluidsoverlast in mijn wijk.	Q10_4 In hoeverre bent u het eens met de volgende stellingen? – Ik ervaar nauwelijks luchtvervuiling in mijn wijk.	Q10_5 In hoeverre bent u het eens met de volgende stellingen? – De straten en andere openbare plekken in mijn wijk zijn schoon en goed onderhouden.	Q11_1 In hoeverre bent u het eens met de volgende stellingen? – Er zijn voldoende winkels voor levensmiddelen in mijn wijk. (bijv. supermarkt, bakkerij, slager, etc.)	Q11_2 In hoeverre bent u het eens met de volgende stellingen? – Er zijn voldoende winkels voor niet-levensmiddelen in mijn wijk. (bijv. drogist, kledingwinkel, warenhuis, etc.)
N	Valid	207	215	214	214	215	214	215	214	215	215	215	213	213	215	215	215	214	212
	Missing	8	0	1	1	0	1	0	1	0	0	0	2	2	0	0	0	1	3
Mean		74.2705	1.19	.32	1.79	4.13	2.98	2.75	4.02	3.62	3.70	3.81	4.07	4.338	3.91	3.86	3.86	4.24	3.40
Std. Deviation		6.35322	6.716	.469	.485	1.101	.180	.814	1.287	1.236	1.266	1.210	1.064	1.0133	1.257	1.280	1.135	1.269	1.385
Variance		40.363	45.108	.219	.235	1.213	.032	.663	1.657	1.527	1.603	1.463	1.132	1.027	1.580	1.638	1.289	1.610	1.918

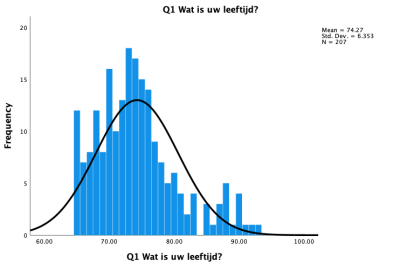
Q11_3 In hoeverre bent u het eens met de volgende stellingen? – Er zijn voldoende faciliteiten voor gezondheidszorg in mijn wijk. (bijv. apotheek, huisarts, tandarts, etc.)	Q11_4 In hoeverre bent u het eens met de volgende stellingen? – Er zijn voldoende faciliteiten voor recreatie en entertainment in mijn wijk. (bijv. café's/restaurants, theater, musea, etc.)	Q11_5 In hoeverre bent u het eens met de volgende stellingen? – Er zijn voldoende faciliteiten voor sport en bewegen in mijn wijk. (bijv. fietspaden, sportschool, zwembad)	Q12_1 In hoeverre bent u het eens met de volgende stellingen? – Er is voldoende straatverlichting in mijn wijk.	Q12_2 In hoeverre bent u het eens met de volgende stellingen? – Ik voel me veilig met betrekking tot letsel in mijn wijk. (bijv. vallen, ongelukken)	Q12_3 In hoeverre bent u het eens met de volgende stellingen? – Ik voel me veilig met betrekking tot misdaad in mijn wijk.	Q12_4 In hoeverre bent u het eens met de volgende stellingen? – Er is voldoende toezicht door de politie in mijn wijk.	Q13_1 In hoeverre bent u het eens met de volgende stellingen? – Ik kan gemakkelijk bestemming en buiten mijn wijk bereiken.	Q13_2 In hoeverre bent u het eens met de volgende stellingen? – Ik ben tevreden met het aantal opties voor vervoer dat ik heb	Q13_3 In hoeverre bent u het eens met de volgende stellingen? – Het openbaar vervoer in mijn wijk is goed en gemakkelijk te gebruiken.	Q14_1 In hoeverre bent u het eens met de volgende stellingen? – Veel vrienden en familie van me wonen in dezelfde wijk als ik.	Q14_2 In hoeverre bent u het eens met de volgende stellingen? – De mensen in mijn wijk zijn te vertrouwen en bereid hun buren te helpen.	Q14_3 In hoeverre bent u het eens met de volgende stellingen? – Ik ben onderdeel van de lokale gemeenschap in mijn wijk.	Q14_4 In hoeverre bent u het eens met de volgende stellingen? – Ik bezoek vaak activiteiten en/of plekken waar ik andere mensen uit mijn wijk ontmoet. (bijv. kerkdienst, buurthuis, club/verenigingen)	Q15_1 In hoeverre bent u het eens met de volgende stellingen? – Ik ben niet van plan om in de toekomst naar een andere woning te verhuizen.	Q15_2 In hoeverre bent u het eens met de volgende stellingen? – De gedachte om misschien te moeten verhuizen brengt me ongemak.	Q15_3 In hoeverre bent u het eens met de volgende stellingen? – Ik ben bereid om in de toekomst te verhuizen, mocht het nodig zijn, mits ik in dezelfde wijk kan blijven wonen.
215	212	213	215	214	214	215	213	214	215	215	215	214	215	214	215	215	214	215	
0	3	2	0	1	1	0	2	1	0	0	0	1	0	0	0	1	0		
4.11	3.06	3.70	4.55	4.21	4.15	3.02	4.45	4.31	3.71	2.46	4.18	3.50	2.92	4.05	3.35	2.72			
1.281	1.400	1.174	.824	1.007	.902	1.104	.992	1.006	1.367	1.310	.907	1.229	1.440	1.278	1.347	1.380			
1.642	1.959	1.379	.678	1.015	.813	1.219	.985	1.012	1.870	1.716	.822	1.509	2.073	1.633	1.816	1.903			

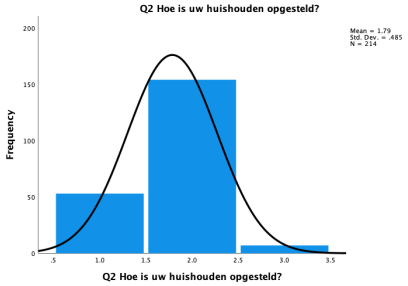
Q3 Wat is uw geslacht?

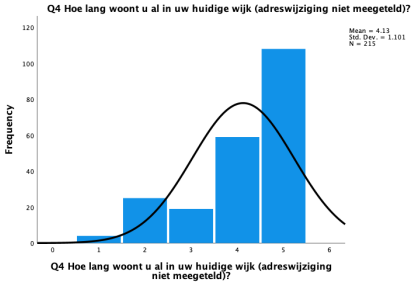
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Vrouw	57	26.5	26.5	26.5
	Man	157	73.0	73.0	99.5
	Anders	1	.5	.5	100.0
	Total	215	100.0	100.0	

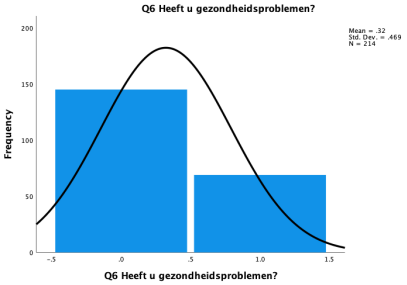
Q5 Wat is uw huidige arbeidsstatus?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Werkloos/werkzoekend	1	.5	.5	.5
	Werkende	3	1.4	1.4	1.9
	Gepensioneerd	210	97.7	98.1	100.0
	Total	214	99.5	100.0	
Missing	System	1	.5		
Total		215	100.0		

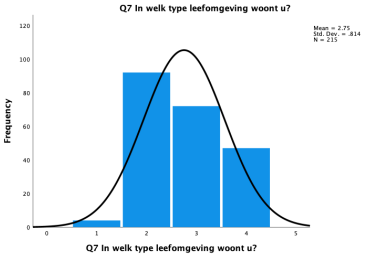






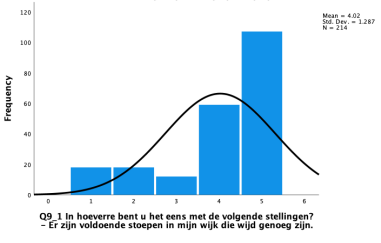


Q7 In welk type leefomgeving woont u?



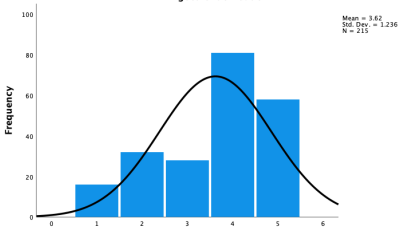
Q7 In welk type leefomgeving woont u?

Q9_1 In hoeverre bent u het eens met de volgende stellingen? – Er zijn voldoende stoepen in mijn wijk die wijd genoeg zijn.



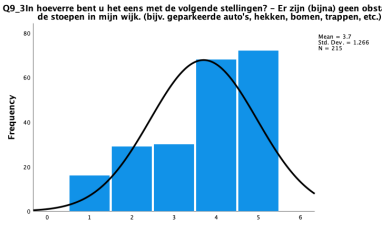
Q9_1 In hoeverre bent u het eens met de volgende stellingen? – Er zijn voldoende stoepen in mijn wijk die wijd genoeg zijn.

Q9_2 In hoeverre bent u het eens met de volgende stellingen? – De stoepen in mijn wijk zijn goed onderhouden.



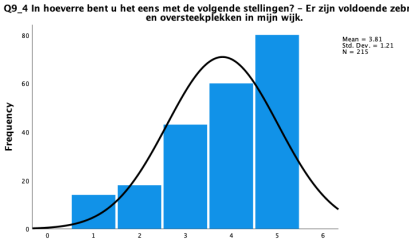
Q9_2 In hoeverre bent u het eens met de volgende stellingen? – De stoepen in mijn wijk zijn goed onderhouden.

Q9_3In hoeverre bent u het eens met de volgende stellingen? – Er zijn (bijna) geen obstakels op de stoepen in mijn wijk. (bijv. geparkeerde auto's, hekken, bomen, trappen, etc.)



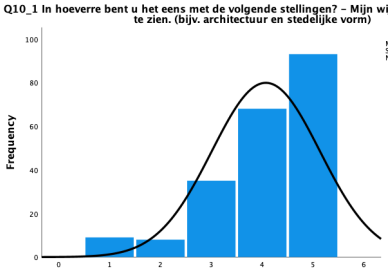
Q9_3In hoeverre bent u het eens met de volgende stellingen? – Er zijn (bijna) geen obstakels op de stoepen in mijn wijk. (bijv. geparkeerde auto's, hekken, bomen, trappen, etc.)

Q9_4 In hoeverre bent u het eens met de volgende stellingen? – Er zijn voldoende zebrapaden en oversteekplekken in mijn wijk.



Q9_4 In hoeverre bent u het eens met de volgende stellingen? – Er zijn voldoende zebrapaden en oversteekplekken in mijn wijk.

Q10_1 In hoeverre bent u het eens met de volgende stellingen? – Mijn wijk is aantrekkelijk om te zien. (bijv. architectuur en stedelijke vorm)



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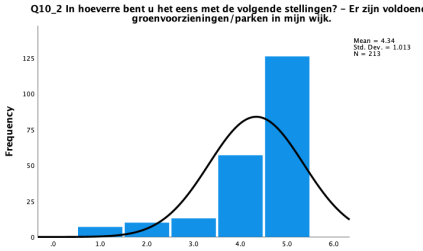

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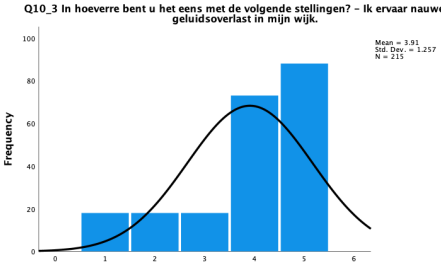

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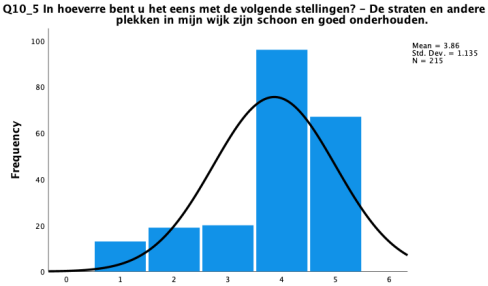

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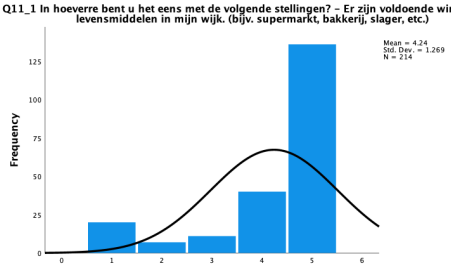

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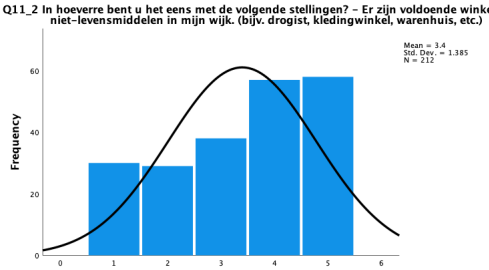

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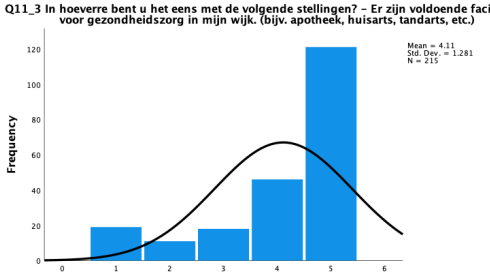

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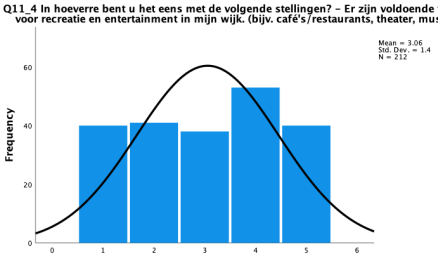

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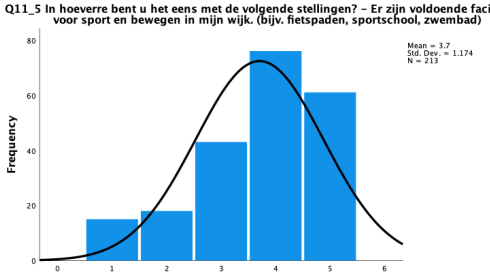

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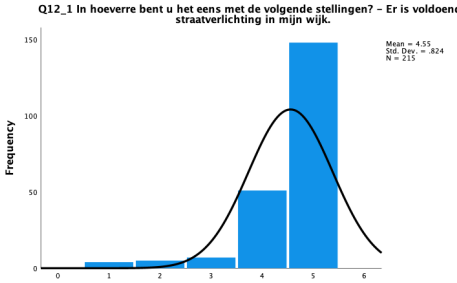

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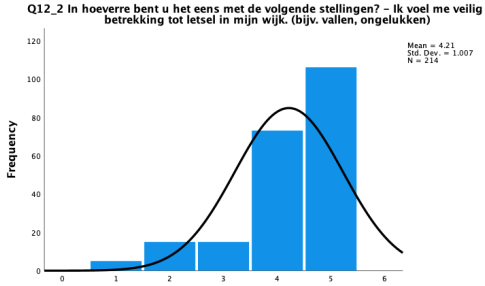

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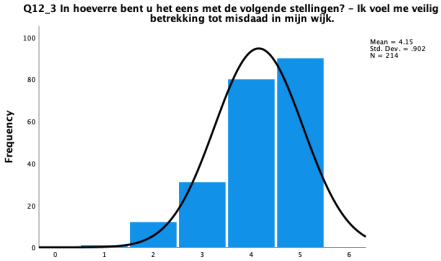

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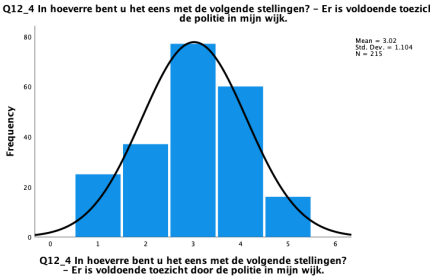

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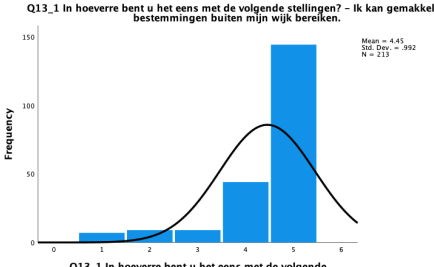

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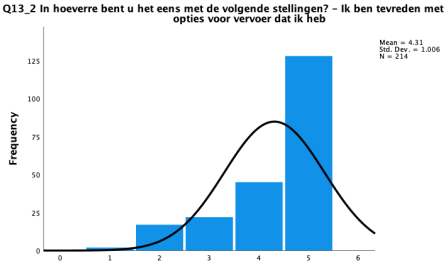

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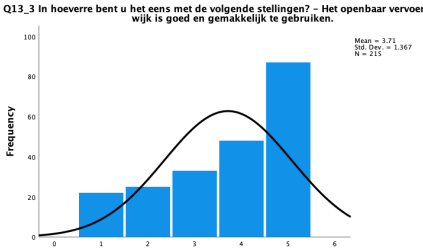

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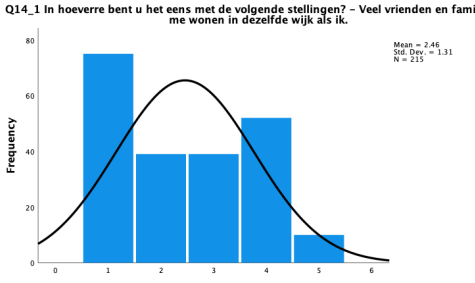

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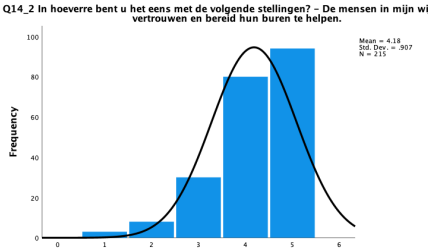

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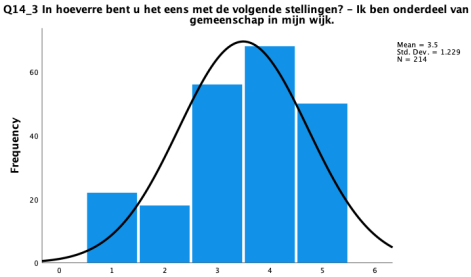

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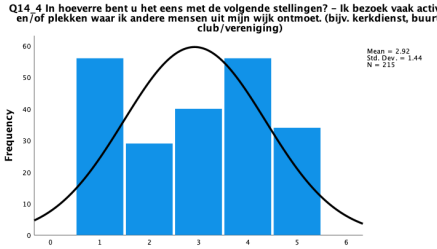

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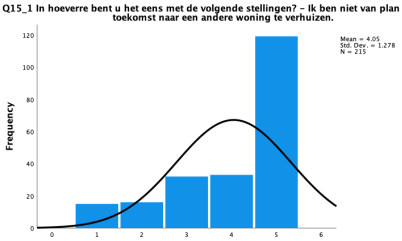
Q15_1 In hoeverre bent u het eens met de volgende stellingen? - Ik ben niet van plan om in de toekomst naar een andere woning te verhuizen.



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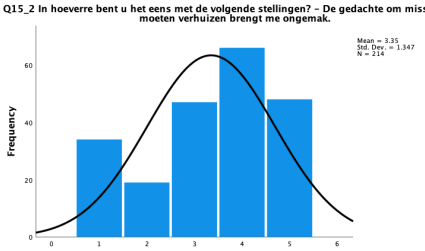

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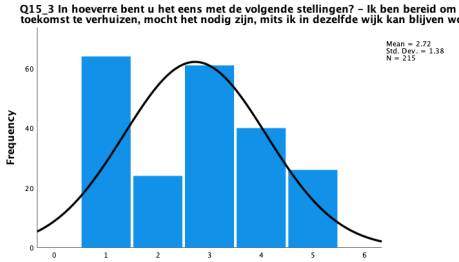

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Appendix 3: Factor Analysis

Rotated Component Matrix[a]

	Component					
	1	2	3	4	5	6
Q9_1 In hoeverre bent u het eens met de volgende stellingen? – Er zijn voldoende stoepen in mijn wijk die wijd genoeg zijn.	.820					
Q9_3In hoeverre bent u het eens met de volgende stellingen? – Er zijn (bijna) geen obstakels op de stoepen in mijn wijk. (bijv. geparkeerde auto's, hekken, bomen, trappen, etc.)	.818					
Q9_2 In hoeverre bent u het eens met de volgende stellingen? – De stoepen in mijn wijk zijn goed onderhouden.	.756					
Q9_4 In hoeverre bent u het eens met de volgende stellingen? – Er zijn voldoende zebrapaden en oversteekplekken in mijn wijk.	.658					
Q10_5 In hoeverre bent u het eens met de volgende stellingen? – De straten en andere openbare plekken in mijn wijk zijn schoon en goed onderhouden.	.432			.393		.41
Q12_3 In hoeverre bent u het eens met de volgende stellingen? – Ik voel me veilig met betrekking tot misdaad in mijn wijk.	.387		.366			
Q11_2 In hoeverre bent u het eens met de volgende stellingen? – Er zijn voldoende winkels voor niet-levensmiddelen in mijn wijk. (bijv. drogist, kledingwinkel, warenhuis, etc.)		.765				
Q11_3 In hoeverre bent u het eens met de volgende stellingen? – Er zijn voldoende faciliteiten voor gezondheidszorg in mijn wijk. (bijv. apotheek, huisarts, tandarts, etc.)		.736				
Q11_5 In hoeverre bent u het eens met de volgende stellingen? – Er zijn voldoende faciliteiten voor sport en bewegen in mijn wijk. (bijv. fietspaden, sportschool, zwembad)		.723				
Q11_4 In hoeverre bent u het eens met de volgende stellingen? – Er zijn voldoende faciliteiten voor recreatie en entertainment in mijn wijk. (bijv. café's/restaurants, theater, musea, etc.)		.711				
Q11_1 In hoeverre bent u het eens met de volgende stellingen? – Er zijn voldoende winkels voor levensmiddelen in mijn wijk. (bijv. supermarkt, bakkerij, slager, etc.)		.634			.380	
Q14_3 In hoeverre bent u het eens met de volgende stellingen? – Ik ben onderdeel van de lokale gemeenschap in mijn wijk.			.833			
Q14_4 In hoeverre bent u het eens met de volgende stellingen? – Ik bezoek vaak activiteiten en/of plekken waar ik andere mensen uit mijn wijk ontmoet. (bijv. kerkdienst, buurthuis, club/vereniging)				.717		
Q14_2 In hoeverre bent u het eens met de volgende stellingen? – De mensen in mijn wijk zijn te vertrouwen en bereid hun buren te helpen.				.708		
Q14_1 In hoeverre bent u het eens met de volgende stellingen? – Veel vrienden en familie van me wonen in dezelfde wijk als ik.				.471		
Q10_4 In hoeverre bent u het eens met de volgende stellingen? – Ik ervaar nauwelijks luchtvervuiling in mijn wijk.					.825	
Q10_3 In hoeverre bent u het eens met de volgende stellingen? – Ik ervaar nauwelijks geluidsoverlast in mijn wijk.					.823	
Q12_2 In hoeverre bent u het eens met de volgende stellingen? – Ik voel me veilig met betrekking tot letsel in mijn wijk. (bijv. vallen, ongelukken)	.360				.545	
Q12_1 In hoeverre bent u het eens met de volgende stellingen? – Er is voldoende straatverlichting in mijn wijk.	.426				.544	
Q13_2 In hoeverre bent u het eens met de volgende stellingen? – Ik ben tevreden met het aantal opties voor vervoer dat ik heb						.855
Q13_1 In hoeverre bent u het eens met de volgende stellingen? – Ik kan gemakkelijk bestemmingen buiten mijn wijk bereiken.						.787
Q13_3 In hoeverre bent u het eens met de volgende stellingen? – Het openbaar vervoer in mijn wijk is goed en gemakkelijk te gebruiken.		.369				.737
Q10_1 In hoeverre bent u het eens met de volgende stellingen? – Mijn wijk is aantrekkelijk om te zien. (bijv. architectuur en stedelijke vorm)						.801
Q10_2 In hoeverre bent u het eens met de volgende stellingen? – Er zijn voldoende groenvoorzieningen/parken in mijn wijk.						.719
Q12_4 In hoeverre bent u het eens met de volgende stellingen? – Er is voldoende toezicht door de politie in mijn wijk.	.354			.359		.365

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.