Housing affordability among older adults in the Netherlands

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Abstract

In recent years we have seen a growing housing affordability crisis in the Netherlands. In current literature attention is focused on how the housing crisis affects the ability to acquire housing. However, older adults might be affected differently compared to the younger population as they are often on fixed incomes. This thesis examines how housing affordability among older adults has changed between 2006 and 2021 with respect to housing tenure, in the Netherlands, using the expenditure-to-income approach. It argues that housing affordability among older adults improved between 2006 and 2021. However, this is largely due to a shift in tenure from social renting towards mortgaged owner-occupation. Therefore, we do not have to worry too much about housing affordability among older adults. Instead, focus should be on those in the private rental tenure, where expenditure-to-income ratios are still above the affordability threshold.

Inhoud

1. Introduction

1.1 Background

In recent years we have seen a growing housing affordability crisis in developed economies, especially in urban centers (Wetzstein 2017; Nijskens et al. 2019). The Dutch housing market suffered more than many other West-European housing markets from the global financial crisis (Boelhouwer, 2020). Housing prices, and rents have been rising in the Netherlands, leading to a situation which is commonly described as 'housing poverty' (Haffner & Boumeester, 2015). Housing affordability, more specifically, providing enough affordable housing for the community's needs is a top priority on political agendas worldwide (Janssen-Jansen & Schilder, 2015). Consequently, much attention is given to housing affordability in academic literature. Attention has been focused on how affordability problems influence the ability to acquire housing, particularly for younger generations. However, the consequences go beyond the ability to purchase a home.

The proportion of older adults in the Netherlands has been growing for the past decades (CBS, n.d. a). Dobner et al. (2016) found that majority of these older adults will be aging in their homes as opposed to institutionalized care facilities. On top of that, the Netherlands has introduced a program, 'Programma Langer Thuis'. The aim is for the elderly to be able to continue to live independently for as long as possible (Ministerie van VWS, 2018).

Older adults who own their homes, bought their home earlier in life and paid off their mortgages before retirement are largely protected against rising housing costs. Since older adults increasingly keep living in their own home (Dobner et al., 2016), they are less subject to major increases in rent prices that are allowed for new contracts (Kunnert, 2016; Haffner & Boumeester, 2014). However, there are also reasons to be concerned. Retirement arrangements in the Netherlands have been reduced, and since 2009 many older adults are receiving a fixed income. Therefore, older adults might have difficulties with rising maintenance costs, home insurance, ground lease and property tax. Additionally, an increasing amount of older adults have mortgage debt (Loibl, 2022), and this might increase further because of the popularity of interest only mortgages in the nineties (Treur & Hooving, 2017; Mastrogiacomo, 2016).

Renters are often subject to higher cost-to-income ratios compared to owner-occupiers. The key to the difference in ratio between tenures is household income, which is lower among renters than owner-occupiers (Haffner & Boumeester, 2014). In the Netherlands an increase in home-ownership in existing neighborhoods tend to lead to a decline in the availability of affordable rentals (Hochstenbach, 2017). Additionally, the number of temporary rental contracts is increasing (Huisman, 2016), particularly in the private rental sector, which increasingly exposes private renters to housing insecurity and higher rental prices. Furthermore, older adults can experience more difficulty moving to housing units with lower costs and can lead to greater livelihood instability (Fenelon & Mawhorter, 2020).

Housing cost burden is significantly associated with psychological health among older adults, regardless of their housing tenure status (Park & Seo, 2022). Furthermore, Pollack et al. (2010) found that housing affordability is related with health and perceived well-being of older adults. The effects of unaffordable housing on mental health seemed to affect renters more than home-owners (Mason et al., 2013). Housing is a fundamental determinant of health, financial security and quality of life, promoting housing affordability and security across the life course can lead to broad improvements to older adults' well-being (Fenelon & Mawhorter, 2020).

Much research has been done in academic literature into the consequences of the housing crisis, and many trends which may influence older adults have been identified, some of which are described above. However, it is unclear how the housing crisis has affected housing affordability among older adults. Since older adults are in a different situation regarding income, effects might be very different to older adults compared to the younger population.

1.2 Research Problem

This thesis aims to investigate how housing affordability among older adults in different housing tenures in the Netherlands has developed from 2006 to 2021.

This thesis addresses the following research question:

"How has housing affordability, among older adults, changed between 2006 and 2021 with respect to housing tenure, in the Netherlands?"

Consequently, the following sub-questions are addressed:

- How has housing tenure changed among older adults between 2006 and 2021?
- How has income changed among older adults between 2006 and 2021?
- How have housing costs changed among older adults between 2006 and 2021?
- How does housing affordability among older adults vary by tenure?

A better understanding of how housing affordability among older adults has changed since 2006 can help identify and potentially solve future problems in housing affordability among older adults, and guide policy development to close the gap between renters and owners, but more importantly improve well-being and health among older adults.

1.3 Structure of the Thesis

Firstly, current academic literature on housing affordability will be discussed in the theoretical framework. Additionally, the theoretical framework will address policy documents and academic literature to identify trends which have potentially influenced housing affordability among older adults between 2006 and 2021. Secondly, the methods used to assess how housing affordability among older adults changed between 2006 and 2021 will be explained and justified. Thereafter, the results will be presented, followed by a discussion and conclusion.

2. Theoretical framework

2.1 Housing tenure

The distinction between owning and renting homes has become a major indicator of difference in housing systems around the world, not merely in terms of quality, social and cultural factors (Flint, 2003; Forrest & Hirayama, 2015). Mortgaged owner occupation is generally seen as the preferred housing outcome (Mckee, 2012), it is the social political and economic norm (Smith, 2015). Additionally, this distinction affects the ability to manage and accumulate wealth (Smith, 2008). Owner-occupation has an investment and consumption dimension. The wealth stored in the home is available for release when needed (Aurand & Reynolds, 2013). Adverse effects of home-ownership became clear after the global financial crisis in 2008. Recent buyers are most vulnerable and are subject to the greatest asset risks (Boelhouwer, 2020; Haffner et al., 2017). On the other hand, home-owners in older generations will have ridden a wave of house price increases that replenished wealth portfolios (Wood et al., 2017). Ethnicity is linked to tenure(Killewald & Bryan, 2018). In addition, educational attainment is a marker for socio-economic advantage in early life and also linked to home-ownership (Mawhorter, et al., 2021).

Haffner and Boumeester (2015) state that the distinction private- versus social rent is not of great importance in the Netherlands. This can be explained by how rent is regulated in the Netherlands. Wether a household is entitled to rental allowance depends on 2 factors: its income and the rent price. In 2023 rental dwellings with a rent lower than € 808,06 are regulated, and may therefore be eligible for rental allowance, depending on their income (belastingdienst, n.d.). However, in recent years private rents have pulled away from social rents. In 2021 private rents increased 2,2% on average compared to an increase of 0,3% for social rent. The increase in 2022 is 3,8% and 2,6% respectively (CBS, 2022a). Therefore, the distinction private- versus social rent might become more important in the Netherlands.

2.2 Income of older adults

Older adults go through a change in income when they retire. On average older adults aged between 55 and 65 have a relatively high income, compared to other countries in the European union (CBS, 2020a). Every older adult, aged over the "AOW leeftijd" (67 years and 10 months), who worked or lived in the Netherlands, receives a state pension (Ministerie van Sociale Zaken en Werkgelegenheid, 2019). Most people aged over 65 no longer experience major income jumps as a result of finding a job, receiving a raise, or being promoted. As a result, their purchase power development is lower than that of the total population. In addition, from 2009, no or limited indexation of many supplementary pensions had a dampening effect (CBS, 2017). Older home-owners have the possibility to supplement their income by liquidating home equity by downsizing or becoming a renter. Choi et al., (2022) found that older adults who take a reverse mortgage and liquidate home equity while remaining in their home can significantly improve their financial situation. However, older adults are reluctant to liquidate home equity (Poterba et al., 2011). Additionally, older households with higher incomes are less likely to leave their homes (Painter & Lee, 2010). Important to note are the dimensions of educational attainment and ethnicity, as these are strong predictors of income throughout the life course (Emmons & Noeth, 2014).

2.3 Housing affordability

Housing affordability is an expression of the social and material experiences of households, in relation to their individual housing situations. Stone (2006) defines affordability as: "*Affordability expresses the challenge each household faces in balancing the cost of its actual or potential housing, on the one hand, and its nonhousing expenditures, on the other, within the constraints of its income.*"

Housing affordability in the Netherlands in general decreased between 2002 and 2006 (Haffner & Boumeester, 2010). Their analyses show that special groups such as older adults, singles, and lower-income groups live in the rental sector. There seems to be a structural change, a widening income gap between the forms of tenure (Haffner & Boumeester, 2010). This is in line with policy in the Netherlands, housing allowances, and rent regulation facilitate the entry of low income groups into rental housing, while mortgage interest deduction mostly targets high-income groups. It is expected that the rental sector will thus in the future tend to cater more for special policy groups, but this will affect its affordability (Haffner & Boumeester, 2010). The increasing number of older adults with mortgage debt (Loibl, 2022), and popularity of interest-only mortgages in de mid 1990s (Treur & Hooving, 2017), might have led to a decreased affordability among older home-owners.

Bramley (2012) investigates the underlying factors of housing affordability. He found that home-owners with mortgages, regardless of age, are less likely to experience housing affordability problems. Additionally, he found that older renters have fewer affordability problems compared to younger renters. In general households who have relocated more recently are reported to be more impacted affected by a lack of housing affordability.

2.4 Housing market developments between 2006 and 2021

The Dutch housing market was affected negatively by the global financial crisis of 2008. The government reacted with several policies in both rented and the owner-occupied sectors (Boelhouwer, 2020; Gent & Hochstenbach, 2020). Currently, housing shortage is the biggest problem on the Dutch housing market (Boelhouwer, 2020). The current housing policy places more and more constraints on the ability of different income levels to access the housing market, which in turn results in physical segregation as well as the marginalization of the affordable private housing sector and social housing sector (Boelhouwer, 2020). Social housing increasingly only functions for people from a lower-level socio-economic class (Musterd, 2014), which includes lower-incomes and retired older-adults. The CBS (2020b) reported a significant increase of home-ownership among older adults between 2006 and 2020. Due to preferences of older adults (Wiles et al., 2011), and policy in the Netherlands (Ministerie van VWS, 2018) older adults remain in their home for a longer time. However, perspectives of low-income older adults diverge notably from mainstream conceptions. Those in subsidized housing often desired to move to safer and more comfortable settings (Finlay et al., 2021).

2.5 Conceptual framework

As shown in the conceptual model in **figure 1**, this paper theorizes that housing market conditions influence housing costs and housing tenure. In turn housing tenure is also linked to housing costs. Household characteristics (level of education, retirement status, ethnicity, household composition, age) help determine household income and housing costs. Household income and housing costs together determine housing affordability.

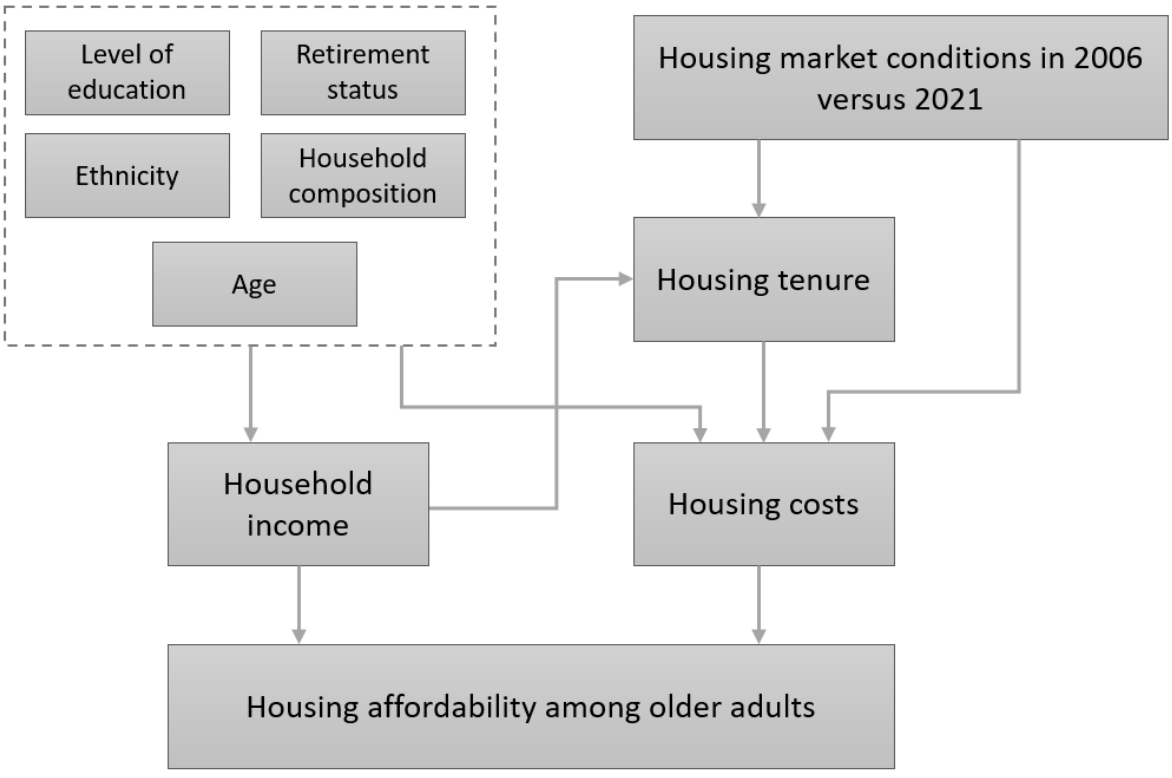

Figure 1. Conceptual model of the links between housing market conditions, housing tenure, household characteristics, housing costs, household income and housing affordability.

2.6 Hypothesis

Homeownership among older adults has increased significantly between 2006 to 2020 (CBS, 2020b). It is expected that preferences of older adults and policy in the Netherlands have led to a shift from rental housing towards owner-occupation. It is expected that older adults home-owners have higher incomes compared to renters and that income has increased significantly as a result of inflation-corrections. Housing costs in general have increased in the Netherlands. Since housing costs are one of the main drivers of inflation it is expected for housing costs to have increased more than the general inflation. I expect housing costs to have risen most for owner-occupiers with a mortgage and private renters. Social renters are partially protected through government subsidies, and housing costs of owner-occupiers without a mortgage are generally low.

Housing affordability among older adults is expected to have decreased between 2006 and 2021. Housing market conditions have changed, housing costs have been rising significantly, while pensions have only risen marginally. However, the major shift from rental to home-ownership might cause an unexpected result.

3. Data and Methods

To answer the research question: "*How has housing affordability, among older adults, changed between 2006 and 2021 with respect to housing tenure, in the Netherlands?"* a quantitative analysis of secondary survey data has been conducted. Secondary data was used as opposed collecting primary data. The WoON survey contains data on housing costs, income and household characteristics, contains large sample size on a national scale. Therefore, using secondary data is the most appropriate, for this thesis its purpose, with the resources available.

3.1 Defining older adults

First to assess housing affordability among older adults in the Netherlands it is necessary to define older adults in terms of age. In academic literature 'older adults' is defined differently, mostly depending on location. The Joint Center for Housing Studies (2019) focuses on households with a head aged over 50. In other articles 'older adults' is defined as people aged 65 and over (e.g. Dobner et al., 2016). This paper will focus on households with a head aged over 55 and there will be differentiated between age groups of ten years and aged 75 and over. This allows us to better assess whether there is a relation between housing affordability and retirement status.

3.2 Data

Two datasets are used in the analysis: WoON 2006 (BZK/CBS, 2006) and WoON 2021 (BZK/CBS, WoON 2021). WoON is an abbreviation of 'WoonOnderzoek Nederland', Housing survey Netherlands, and is conducted every three years by the CBS, Central Bureau for statistics, in cooperation with the Ministry of the Interior and Kingdom Relations. The aim of the housing survey is to gather statistical information about the housing situation of the Dutch population and its wishes and needs in terms of housing. Attention is paid to the composition of households, the home and living environment, housing costs, housing requirements and relocations (CBS, n.d. b). The target population of the WoON dataset is people aged 18 and over in private households in the Netherlands. It uses the statistical units: persons, households, potential households, and inhabited dwellings.

The data collected through surveys are supplemented with data from registers. The survey data is collected through personal interviews, telephone interviews, and since 2009 also via the internet. The external sources used the supplement the survey data are: Personal records database (BRP), tax

authorities, energy companies, and the energy module which is used to estimate maintenance costs for homeowners.

3.3 Sample selection

The analytic sample includes households with head of household aged over 18. Thereafter housing cost-to-income ratio was calculated with disposable income (household level) and total housing costs (household level). Higher-than-expected- and lower-than-expected values were excluded, keeping values between 0 and 100. This reduced the sample sizes to 53563 in 2006 and 38415 in 2021. Values above 100 are mostly due to low incomes and only with some cases having excessive housing costs. Negative values were mostly due to negative disposable incomes. A negative disposable income is expected to be a result of high capital taxes, therefore negative values on housing cost-to-income ratio are misleading because they represent a case in which a household is not able to pay the full housing costs while these values mostly concern very wealthy households. Within the analytic sample 22334 are older adults (head of household aged over 55) in 2006 and 19832 in 2021.

3.4 Measure of housing affordability

There are several ways to measure housing affordability. A brief scan of the recent literature suggests that most studies and planners typically examine the relationship between housing expenditure and income, representing the financial dimension of affordability (Ezennia & Hoskara, 2022). The expenditure-to-income ratio is also the method used by the Dutch ministry when dealing with issues of housing affordability (Haffner & Boumeester, 2010). This research is aiming to assess how housing affordability has developed between 2006 and 2021. Although there are several limitations to this method (see Nwuba & Kalu, 2018), the available data and purpose of the study make the expenditure-to-income ratio the most suitable for the purposes for this paper. In the Netherlands a ratio of 30 percent is seen as affordable (nibud, n.d.).

3.5 Variables

1. Tenure

   The WoON datasets distinguish between two types of tenure. A new tenure variable was computed with data on home ownership, whether respondents still had a mortgage, and eligibility of rental allowance based on rental price. Resulting in a tenure variable with four categories: owner-occupied with mortgage, owner-occupied no mortgage, private rent, and social rent.

2. Housing cost-to-income ratio

   A measure of affordability was introduced by computing a new variable: housing cost-to-income ratio. This is the total housing costs as a percentage of disposable household income.

3. Disposable income (VROM definition)

   Income remaining after deduction of taxes and social security charges, available to be spent or saved as one wishes. Excluding expenditures and tax-effects related to housing.

4. Total housing costs

   The total housing costs are made up differently for tenants and owners. For tenants, the net housing expenditure is the gross rent, minus the rent allowance, plus the additional living expenses. For homeowners, the net housing expenses are the gross mortgage payments, plus property tax, property insurance and maintenance costs, minus the tax effect of the owner-

occupied home, plus additional housing expenses. The additional housing expenses for tenants and owners are made up similarly and consist of taxes paid to public bodies and the costs of energy and water consumption.

5. Retirement

   Retirement status is derived from the main source of income resulting in a dichotomous variable.

6. Education level

   Highest level of education achieved in three categories: low, middle, and high. Educational attainment is a strong predictor for income (Emmons & Noeth, 2014) but is also a marker for socio-economic advantage early in life and linked to home-ownership (Mawhorter, et al., 2021). Therefore, it may confound the relationship between tenure and housing affordability.

7. Household type

   Household type in three categories: single-person household, multi-person household with minor(s), and multi-person household without minor(s).

8. Country of birth

   Country of birth in three categories: Netherlands, western, and not-western. Ethnicity is a strong predictor for income (Emmons & Noeth, 2014). In addition, ethnicity is also associated with tenure (Killewald & Bryan, 2018). By including country of birth in our models we can account for this relationship, as the proportions within the sample are not equal.

3.6 Statistical analysis

To determine how housing costs, and disposable income, by tenure have changed between 2006 and 2021 two separate ordinary least square regressions were run with monthly housing costs, and monthly income as the dependent variables. Variables of interest are housing tenure and year (indicating the change from 2006 to 2021) and age. The models control for household type, retirement status, country of birth, and level of education. In this model all age groups are included to determine how housing costs and income have developed among older adults compared to the younger population. Furthermore, the models will not be inflation-adjusted because housing costs are a major component of inflation and older adults often receive fixed incomes.

In contrast to the analysis of housing costs and income the analysis of housing affordability only includes older adults. First, I want to determine how housing affordability among older adults changed between 2006 and 2021. Thereafter the relationship between housing tenure and housing affordability will be analyzed. Finally, I will analyze if and how this relationship, between housing tenure and housing affordability differentiates in 2006 and 2021.

To determine how housing affordability among older adults varies by tenure and year an ordinary least squares regression was run with housing cost-to-income ratio as the dependent variable. The variables of interest in the model are housing tenure and year. Since we focus on older adults we included retirement and age. Additionally the model controls for household type, level of education and country of birth.

Furthermore, a second model with an interaction term is run to determine whether tenure affects housing affordability differently in 2021 compared to 2006. In this model the variable year is interacted with tenure.

3.7 Ethical considerations

This thesis uses secondary, anonymized data. Permission to use the data for purposes of this thesis was granted by the data manager. The researches has taken note of the "Wet Bescherming Persoonsgegevens" as required by the additional terms of use. Data is stored in a password protected drive, and will only be used for the purposes of this study.

4. Results

Table 1 reports means for key variables and the weighted sample characteristics presented separately for 2006 and 2021. Both sample sizes, 2006 (*n*=53363) and 2021 (*n*=38415) are sufficiently large to conduct statistical analysis. Mean housing cost-to-income ratio in 2006 was 28.747 percent and decreased to 25.892 percent in 2021. The distribution of older adults in housing tenures has changed. In 2021 the share of older adults in owner-occupied housing has increased significantly, see the descriptive statistics table on the older population in the appendix. Additionally the proportion of older adults with a low level of education is lower in 2021 (0.387) compared to 2006 (0.617) and the proportion of older adults with a medium- or high level of education increased.

Table 1. Descriptive statistics containing all age groups

WoON Respondents in analytic sample (*n* = 42251)	2006 (*n* = 53363)		2021 (*n* = 38415)		Difference t tests
	Mean	SE	Mean	SE	Difference
Housing cost-to-income ratio	28.747	0.063	25.892	0.067	-2.855***
Total housing costs (€/month)	600,452	1.332	844.992	2.395	244.540***
Disposable household income (€/month)	2,508.338	6.887	3,963.741	19.305	1,455.403***
Housing tenure	Prop.	SE	Prop.	SE	Difference
Owner-occupied with mortgage	0.475	0.002	0.526	0.003	0.050***
Owner-occupied no mortgage	0.076	0.001	0.137	0.002	0.061***
Private	0.038	0.001	0.083	0.001	0.044***
Social	0.411	0.002	0.255	0.002	-0.156***
Household type					
Single-person household	0.296	0.002	0.311	0.002	0.016***
Multi-person household with minor	0.289	0.002	0.232	0.002	-0.057***
Multi-person household no minor	0.415	0.002	0.457	0.003	0.042***
Age					
18-24	0.027	0.001	0.022	0.001	-0.005***
25-34	0.152	0.002	0.138	0.002	-0.014***
35-44	0.207	0.002	0.147	0.002	-0.060***
45-54	0.195	0.002	0.177	0.002	-0.018***
55-64	0.174	0.002	0.198	0.002	0.023***
65-74	0.125	0.001	0.186	0.002	0.060***
75 and older	0.119	0.001	0.133	0.002	0.014***
Retirement					
Is retired	0.271	0.002	0.308	0.002	0.037***
Socio-economic control measures					
Low level of education	0.438	0.002	0.259	0.002	-0.179***
Medium level of education	0.293	0.002	0.358	0.002	0.064***

High level of education	0.263	0.002	0.381	0.002	0.118***
Unknown level of education	0.006	0.000	0.003	0.000	-0.003***
Dutch	0.869	0.001	0.897	0.002	0.028***
Western	0.051	0.001	0.047	0.001	-0.004**
Not-western	0.080	0.001	0.056	0.001	-0.024***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4.1 Tenure

In **figure 2** a visualization of the change in tenure among older adults between 2006 and 2021 is shown. It shows a shift from rental housing towards owner-occupied housing. Especially the share of social housing has decreased significantly. In turn the share of owner-occupied housing with a mortgage increased from 31,7 percent to 45.6 percent. Additionally, the share of older adults in owner-occupied without a mortgage increased to 21.3 percent. The share of older adults in private or deregulated rent increased to 5.8 percent.

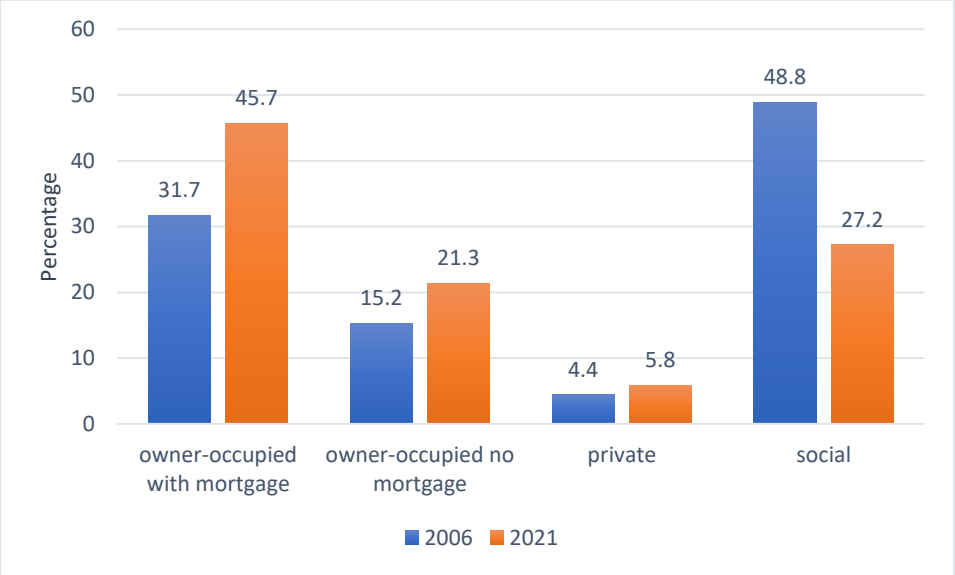

Figure 2. Share of older adults by tenure

4.2 Income

Table 2 presents the results of ordinary least squares regression for disposable income, controlling for household type, country of birth, and level of education. An interaction term, with tenure interacting with year, is run to determine whether income changed differently depending on tenure. The model without the interaction reports a coefficient for Year of 1203.83 ($p < 0.001$) and the model with interaction reports a coefficient of 1632.601 ($p < 0.001$). All three coefficients for the interaction are significant and the R-squared value is higher. Therefore, this model will be used for the remaining analysis for disposable income.

Retirement has a coefficient of -459.773 ($p < 0.001$). Furthermore, the model income peaks at age 45-54 and drops after that. Inflation from 2006 to 2021 is 28.63 percent (CBS, 2023). **Figure 3** presents predicted household income of people aged over 55, by tenure. Predicted mean disposable income is lower for tenants than for owner-occupiers in both 2006 and 2021. Disposable income in all tenures increased more than the inflation. However, it increased most in owner-occupied with

mortgage, 77.34 percent. Compared to 56.51 percent in owner-occupied without mortgage and 56.08 and 43.01 percent in private and social respectively.

Table 2. Estimated coefficients from ordinary least squares regression measuring the relation between disposable income and year, housing tenure, household type, age, retirement, country of birth, level of education

OLS Regression	Model without interaction		Model with interaction	
DP: Disposable income (€/month)	Coef.	SE	Coef.	SE
Year, ref. 2006				
2021	1206.683***	17.167	1632.601***	23.453
Tenure, ref owner-occupied with mortgage				
Owner-occupied no mortgage	-89.028**	29.557	116.405**	42.856
Private	-582.060***	36.841	-259.699***	57.025
Social	-1013.001***	20.468	-622.223***	24.443
Tenure interaction Year, ref. 2021 owner-occupied with mortgage				
2021 Owner-occupied no mortgage			-430.356***	56.094
2021 Private			-652.047***	73.365
2021 Social			-1085.302***	37.612
Household type, ref. one-person household				
Multi-person household with minor	1542.641***	25.782	1514.880***	25.686
Multi-person household no minor	1350.806***	20.283	1327.791***	20.224
Age, ref. 18-54				
25-34	381.602***	56.043	385.720***	55.793
35-44	705.276***	56.579	699.717***	56.322
45-54	1142.657***	55.556	1118.881***	55.313
55-64	1033.491***	55.749	997.704***	55.519
65-74	825.471***	65.846	788.736***	65.576
75 and older	862.826***	68.731	812.040***	68.470
Retirement, ref. Not retired				
Retired	-452.730***	38.773	-459.773***	38.597
Country of birth, ref. Netherlands				
Not-western	-328.573***	33.149	-341.109***	33.006
Western	-22.483	37.615	-20.215	37.444
Level of education, ref. low				
Middle	252.018***	21.047	263.046***	20.957
High	1095.269***	21.958	1087.806***	21.861
Unknown	-15.964	124.153	-44.641	123.594
Constant	921.571***	58.586	774.510***	58.617
Observations	91778		91778	
R-squared	0.250		0.257	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

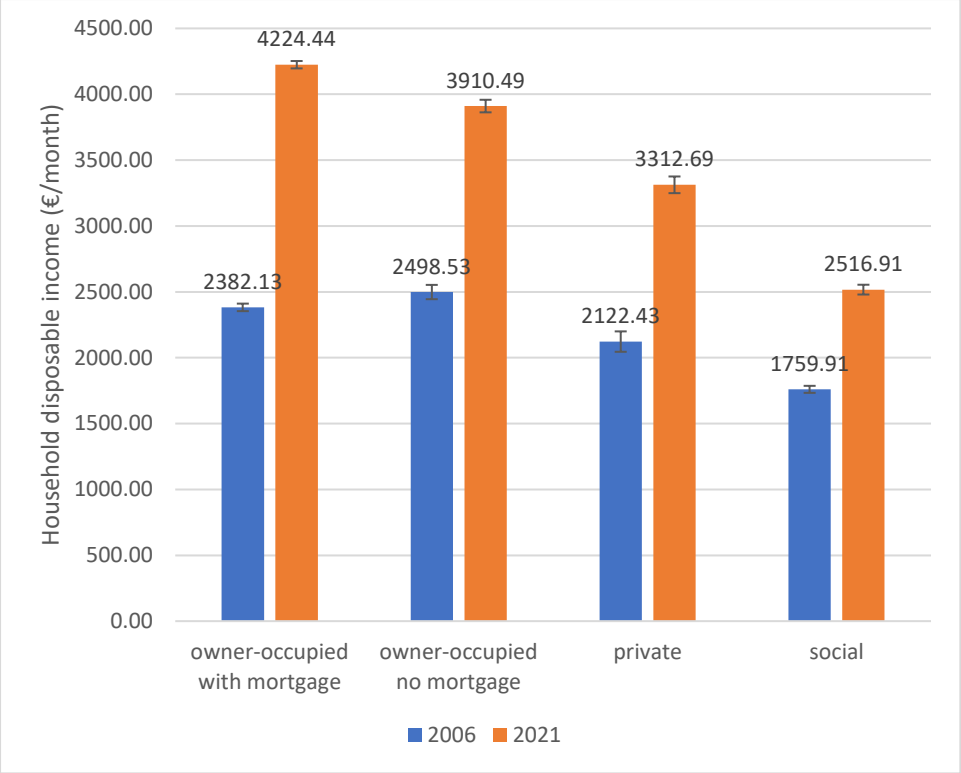

Figure 3. Predicted disposable household income of older adults by tenure. 84% confidence intervals are used. The 84% confidence levels are a visual representation for 95% statistical significance levels (Knol, et al., 2011)

4.3 Housing costs

Table 3 presents the results of ordinary least squares regression for housing costs (not inflation-adjusted), controlling for household type, country of birth, and level of education. An interaction term, with tenure interacting with year, is run to show whether changes in housing costs can be explained by changes in tenure. The model without the interaction reports a coefficient for Year of 231.956 ($p < 0.001$) and the model with interaction reports a coefficient of 331.451 ($p < 0.001$). The interaction terms report significant coefficients for all three categories. Coefficients for the older population are lower compared to the younger population. Therefore, expected mean housing costs of older adults are lower compared to the younger population.

Figure 4 presents predicted housing costs of people aged over 55, by tenure.. Housing costs of older adults in owner-occupied with mortgage increased with 77.34 percent. Owner-occupiers without a mortgage and private renters housing costs increased by approximately 37.34 and 45.38 percent respectively, and 25.45 percent for social renters. Housing costs in all tenures except for social renters, increased more than the inflation of 28.63 percent, between 2006 and 2021.

Table 3. Estimated coefficients from ordinary least squares regression measuring the relation between housing costs and year, housing tenure, household type, age, retirement, country of birth, level of education

OLS Regression	Model with interaction		Model without interaction	
DP: Total housing costs (€/month)	Coef.	SE	Coef.	SE
Year, ref. 2006				
2021	231.956***	2.256	331.451***	3.050
Tenure, ref owner-occupied with mortgage				
Owner-occupied no mortgage	-446.276***	3.884	-312.630***	5.574
Private	132.915***	4.841	132.718***	7.417
Social	-164.758***	2.689	-81.909***	3.179
Tenure interaction Year, ref. 2021 owner-occupied with mortgage				
2021 Owner-occupied no mortgage			-251.907***	7.296
2021 Private			-28.203**	9.542
2021 Social			-225.187***	4.892
Household type, ref. one-person household				
Multi-person household with minor	203.103***	3.388	198.670***	3.341
Multi-person household no minor	127.537***	2.665	123.129***	2.630
Age, ref. 18-24				
25-34	63.235***	7.364	63.172***	7.257
35-44	94.956***	7.434	94.111***	7.325
45-54	96.929***	7.300	91.762***	7.194
55-64	63.754***	7.325	55.602***	7.221
65-74	47.899***	8.652	40.190***	8.529
75 and older	85.156***	9.031	75.044***	8.905
Retirement, ref. Not retired				
Retired	-28.446***	5.094	-30.229***	5.020
Country of birth, ref. Netherlands				
Not-western	-48.364***	4.355	-49.143***	4.293
Western	17.124**	4.942	17.645***	4.870
Level of education, ref. low				
Middle	19.983***	2.765	23.112***	2.726
High	134.511***	2.885	133.315***	2.843
Unknown	15.687	16.313	12.096	16.075
Constant	479.142***	7.698	442.820***	7.624
Observations	91,778		91,778	
R-squared	0.362		0.380	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

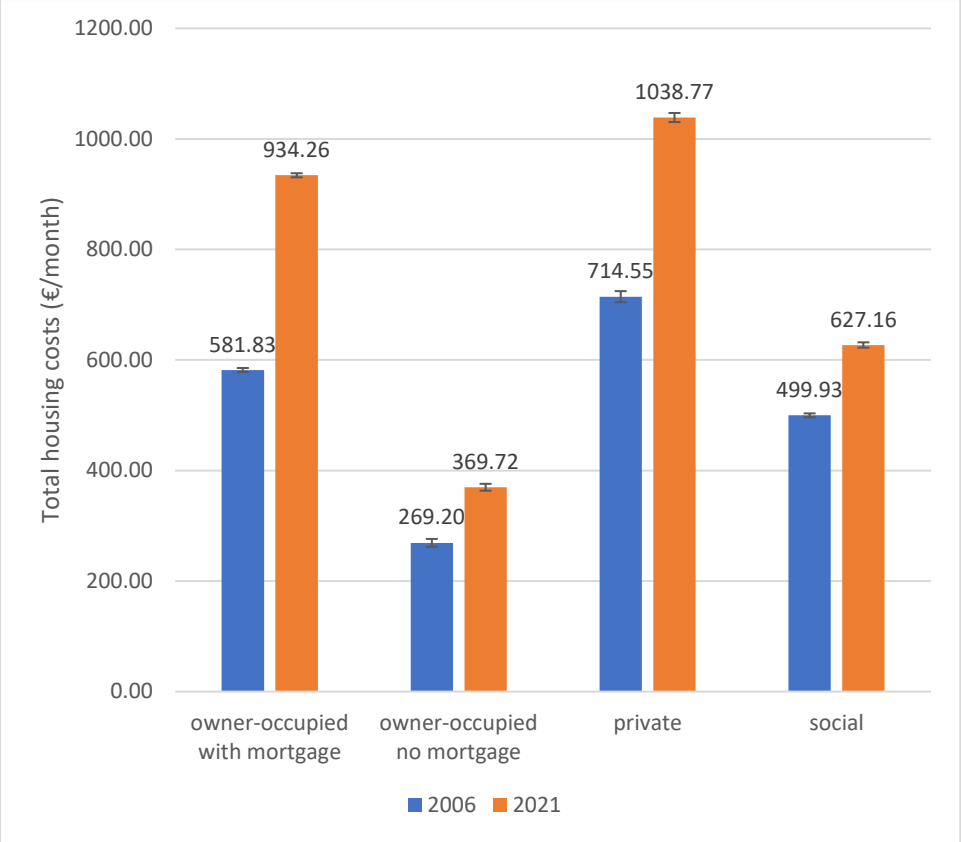

Figure 4. Average housing costs of older adults by tenure. 84% confidence intervals are used. The 84% confidence levels are a visual representation for 95% statistical significance levels (Knol, et al., 2011)

4.5 Housing Affordability

Table 4 presents the results of ordinary least squares regression for housing cost-to-income ratio, controlling for household type, country of birth, and level of education. In the model without interaction the coefficient for year is -1.347 ($p < .001$). The coefficients for tenure show that housing affordability is highly dependent on housing tenure. Both private and social have positive coefficients. Mean housing cost-to-income ratio among older adults in private- and social housing is respectively 12.638 ($p < .001$) and 6.383 ($p < .001$) percent higher compared to older adults in owner-occupied with a mortgage. Older adults in private and social have higher housing cost-to-income ratios than both owner-occupier tenures. Older adults in private have the highest housing cost-to-income ratios and older adults in owner-occupied without mortgage the lowest housing cost-to-income ratios.

Figure 2 shows a shift from rental housing towards owner-occupied housing. Owner-occupied housing has a lower mean housing cost-to-income ratio compared to rental housing. Since housing tenure has a strong relationship with housing cost-to-income ratio the change in the distribution of type of tenure might partially explain the change in mean housing cost-to-income ratio. Therefore a model with an interaction term is run.

In the model with interaction the variable Year is interacted with housing tenure to show whether changes in affordability can be explained by changes in tenure. In this model the coefficient for Year is 0.061, which is not statistically significant. The second model shows that the coefficient of the variable year, is dependent on housing tenure. The interaction is significant for all 3 categories:

owner-occupied no mortgage, private and social. The coefficient 2021 owner-occupied is 0.800 (p < .05) indicating the effect of year on the housing cost-to-income ratio when the tenure value is owner-occupied no mortgage. The coefficients for 2021 private and 2021 social are -3.705 (p < .001) and -3.758 (p < .01) respectively. Meaning that the variable year has a negative effect on the housing cost-to-income ratio in both private and social housing tenure.

Table 4. Estimated coefficients from ordinary least squares regression measuring the relation between housing cost-to-income ratio and year, housing tenure, household type, age, retirement, country of birth, level of education.

OLS Regression	Model without interaction		Model with interaction	
DP: Housing cost-to-income ratio	Coef.	SE	Coef.	SE
Year, ref. 2006				
2021	-1.347***	0.117	0.061	0.182
Tenure, ref owner-occupied with mortgage				
Owner-occupied no mortgage	-10.352***	0.163	-10.762***	0.242
Private	12.638***	0.265	14.677***	0.39
Social	6.383***	0.144	7.939***	0.185
Tenure interaction Year, ref. 2021 owner-occupied with mortgage				
2021 Owner-occupied no mortgage			0.800*	0.317
2021 Private			-3.705***	0.523
2021 Social			-3.758***	0.26
Household type, ref. one-person household				
Multi-person household with minor	-8.263***	0.413	-8.386***	0.411
Multi-person household no minor	-8.328***	0.122	-8.420***	0.122
Age, ref. 55-64				
65-74	0.013	0.189	-0.038	0.189
75 and older	0.935***	0.212	0.799***	0.211
Retirement, ref. Not retired				
Retired	0.589**	0.185	0.572**	0.184
Country of birth, ref. Netherlands				
Not-western	1.919***	0.309	2.014***	0.308
Western	0.924***	0.258	0.974***	0.257
Level of education, ref. low				
Middle	-1.769***	0.14	-1.781***	0.14
High	-3.775***	0.149	-3.817***	0.149
Unknown	0.401	0.981	0.506	0.977
Constant	32.614***	0.18	31.951***	0.195
Observations	42,166		42,166	
R-squared	0.383		0.387	

* p < 0.05, ** p < 0.01, *** p < 0.001

Furthermore, variables of interest for older adults are age, and retirement. In both models the coefficient for 65-74 is not significant so we must assume that there is no difference with the age group 55-64. The coefficient for 75 and over is 0.799 (p < .001). Therefore older adults aged 75 and over have slightly higher housing cost-to-income ratios. Also retired people have higher housing cost-to-income ratios than working older adults.

Figure 5 presents the predicted housing cost-to income ratio in each tenure in 2006 and 2021. This shows that housing cost-to-income ratio decreased in each tenure except for owner-occupied no mortgage. This also clearly visualizes that housing cost-to-income ratio is lower in owner-occupied housing compared to rental housing.

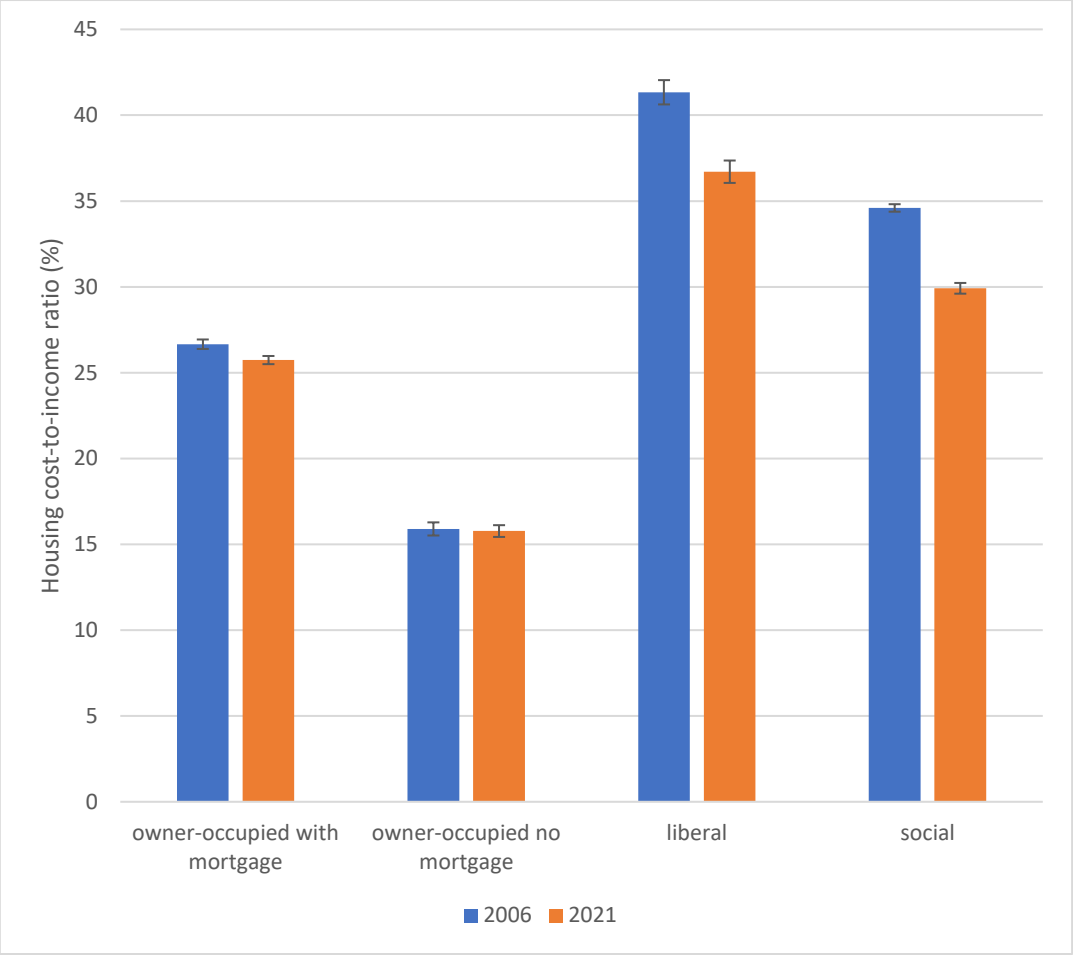

Figure 5. Predicted housing cost-to-income ratio in different tenures in 2006 and 2021. 84% confidence intervals are used. The 84% confidence levels are a visual representation for 95% statistical significance levels (Knol, et al., 2011)

5. Discussion

The results of this thesis provide insight into how housing affordability among older adults in different housing tenures in the Netherlands has changed between 2006 and 2021. Housing affordability among older adults has improved between 2006 and 2021. However, the regression coefficients show this improvement is largely due to the shift from social housing towards owner-occupation, also presented in the results. This shift could be a result of the increase of the share of older adults with a medium to high level of education as that is a strong predictor of home-ownership (Mawhorter, et al., 2021). Additionally, the change in tenure distribution is in line with the preference of older adults to age at home (Dobner et al., 2016), and policy in the Netherlands (Ministerie van VWS, 2018). Both, social and private renters have higher predicted housing cost-to-income ratios than owner-occupiers, explaining the decrease in housing cost-to-income ratio. Zooming in on each housing tenure the results indicate that housing affordability among private and social renters improved more compared to owner-occupiers, which would mean a reverse of the widening housing affordability gap between renting and owning in 2010 (Haffner& Boumeester, 2010).

The analysis of income shows that household income has increased between 2006 and 2021, and is dependent on tenure. Note that the results are not adjusted for inflation. Household income in all tenures increased more compared to the rate of inflation of 28.63 percent. Similarly to the development of household income, the analysis of housing costs reveals that housing costs of older adults have increased more than the rate of inflation between 2006 and 2021 and are also highly dependent on tenure.

Haffner & Boumeester (2014) found that the key to the difference in housing cost-to-income ratio between tenures is household income. Looking at the change in housing costs and household income between 2006 and 2021 this seems to be different for older adults. Even though the changes in income are larger than the changes in housing costs, the changes in housing costs differ more between tenures. Therefore, the fact that housing affordability among private and social renters improved more compared to owner-occupiers is largely due to the changes in housing costs and not so much a result from changes in household income.

6. Conclusion

The results of this thesis reveal that, despite rising housing prices and a below average increase in purchasing power, housing affordability among older adults improved from 2006 to 2021. However, this is largely due to a shift from social renting towards owner-occupation. Therefore, we do not have to worry too much about housing affordability among older adults. However, there are concerns for those in private rental tenure, because their expenditure-to-income ratio is considered unaffordable (Nibud, n.d.). The trend that social housing increasingly only functions for people from a lower-level socio-economic class (Musterd, 2014) seems to have continued. Therefore, this thesis has suggests that planners should aim to expand the social housing sector and focus on providing enough social housing for those who cannot afford private rental nor a mortgage. The major shift from rental to home-ownership among older adults might affect the ability to purchase a home for younger generations. This should raise concerns for policy makers especially in relation to Program Aging at Home.

6.1 Limitations and future research

This thesis applies the expenditure-to-income ratio approach to determine housing affordability. Reliable data on a national scale and a large sample size was used and the regressions control for

many factors. However, this thesis also has its limitations. There is an ongoing debate on the suitability of different affordability measures (Nwuba & Kalu, 2018). Alternative methods are the residual income approach and other modified approaches. To get a better understanding of how housing affordability among older adults has changed I propose to apply other measures of affordability. Building on that another recommendation for future research is to develop a modified measure of housing affordability specifically developed for older adults, as their income is often fixed. Furthermore, this paper lacks the qualitative dimension of housing affordability. This research could be expanded by including housing quality measures, which asses what households are paying for. This could be based on number of rooms, relative to household composition.

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7. Appendix

Table A. Descriptive statistics older adults.

WoON Respondents in analytic sample (*n* = 42116)	2006 (*n* = 22334)		2021 (*n* = 19832)		Difference t tests
	Mean	SE	Mean	SE	Difference
Housing cost-to-income ratio	29.544	0.101	25.393	0.094	-4.152***
Total housing costs (€/month)	524.617	1.796	709.347	2.727	184.730***
Disposable household income (€/month)	2199.973	10.780	3510.355	27.734	1310.381***
Housing tenure	Prop.	SE	Prop.	SE	Difference
Owner-occupied with mortgage	0.317	0.003	0.457	0.004	0.141***
Owner-occupied no mortgage	0.152	0.002	0.213	0.003	0.061***
Private	0.044	0.001	0.058	0.002	0.014***
Social	0.488	0.003	0.272	0.003	-0.216***
Household type					
Single-person household	0.413	0.003	0.374	0.003	-0.039***
Multi-person household with minor	0.017	0.001	0.023	0.001	0.006***
Multi-person household no minor	0.570	0.003	0.603	0.003	0.033***
Age					
55-64	0.417	0.003	0.383	0.003	-0.033***
65-74	0.300	0.003	0.359	0.003	0.060***
75 and older	0.284	0.003	0.258	0.003	-0.026***
Retirement					
Is retired	0.647	0.003	0.587	0.003	0.060***
Socio-economic control measures					
Low level of education	0.617	0.003	0.387	0.003	-0.230***
Medium of education	0.196	0.003	0.329	0.003	0.133***
High level of education	0.184	0.003	0.280	0.003	0.095***
Unknown level of education	0.003	0.000	0.004	0.000	0.001*
Dutch	0.916	0.002	0.918	0.002	0.002
Western	0.053	0.001	0.043	0.001	-0.010***
Not-western	0.031	0.001	0.039	0.001	0.007***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$