Preferences for common facilities within co-housing projects

An evaluation on how different common facilities are preferred within co-housing projects among elderly

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PREFERENCES FOR COMMON FACILITIES WITHIN CO-HOUSING PROJECTS

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Master Thesis

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PREFACE

Below is my master thesis entitled 'Preferences for common facilities within co-housing projects', marking the completion of my master study in Urban Systems and Real Estate (USRE) at the Eindhoven University of Technology (TU/e) – a program primarily focused on various aspects and the functioning of area- and city development. I pursued the master's track (including pre-master) from September 2021 to April 2024, which I found to be a highly challenging yet educative period.

This thesis delves into the housing preferences of (future) elderly in relation to 'co-housing', a housing concept wherein each household disposes of its own traditional and private dwelling, while one or multiple common facilities are shared among residents to stimulate and facilitate social interaction and neighbor support. This master's thesis centers the practical and tangible question, which common facilities within co-housing projects are the most preferred among elderly.

Looking back at this graduation project, the past period has been very instructive for me. I have significantly expanded my insight and knowledge regarding co-housing. I have learned about the important contribution that this social housing concept can make to society, about typical co-housing characteristics, and about the social and societal values that are intertwined in this distinctive housing concept. Moreover, studying reference projects has provided me with insights into the existence of various types of co-housing projects, all distinguished by specific features and principles; from larger co-housing projects within an urban context, to smaller and mor rural co-housing initiatives. Based on this, it can be argued that there is a co-housing project for everyone.

Additionally, I have also learned a great deal from the research process itself, and applying what I have learned over the past two years during the master's program. From conducting a solid and focused literature study, to critical think about- and making choices on how to manage the research itself through the process, methodology, experimental design, questionnaire setup et cetera. And, from collecting, analyzing and interpreting data and drawing conclusions from it, to always maintain a critical stance on your own actions in order to work towards your research objective.

The results and the quality of this research are partly due to the people around me. Firstly, I would like to thank Stephan Maussen and Peter van der Waerden for their excellent guidance and always being available as a sparring partners during the entire process. Furthermore, I would also like to thank Theo Arentze for his critical perspective on the research, in his role of chairman. Additionally, my gratitude is extended to all individuals and organizations who completed and distributed the questionnaire. Specifically I would like to thank Kilimanjaro Wonen, Cooplink and LVGO for distributing the questionnaire among their substantial number of newsletter members.

Through this research and its findings, I hope to inspire individuals, organizations and initiators of co-housing projects to make sustainable choices in the development of housing projects, focusing on the long term, which strongly contribute to housing and living comfort, social interactions, quality of life and people's physical and mental wellbeing.

Enjoy your reading!

Niels Mans

April 2024, Weert

SUMMARY

The Netherlands has to deal with an increasingly ageing society and a rising 'old age dependency ratio'. Given the growing and unsustainable pressure within the elderly care sector, both regarding retirement homes and available personnel, a new approach to manage this trend is needed. In alignment with the preferences of the new generation of elderly, there is a focus on 'ageing in place', whereby elderly live as long as possible independently in their own dwelling. A housing concept that can significantly contribute to these challenges is co-housing, characterized by the fact that each household disposes of their own 'traditional' private dwelling, accompanied by one or multiple common facilities to encourage and facilitate social interaction and neighbor support among residents. Co-housing – whether or not related to elderly – is a subject that has been extensively researched. However, to date no research has been conducted on which common facilities within a co-housing project, enjoy the highest preferences among the elderly. Additionally, the possible influence of personal characteristics, and the associated costs of the common facilities on these preferences, remains an understudied theme too.

Based on this, the research objective is to investigate what common facilities within a co-housing project are preferred among elderly, and to determine which factors influence these preferences. All in all, the main research question reads as follows: "What common facilities within co-housing projects are preferred among elderly, and what factors influence these preferences of elderly?"

Firstly, a literature study has been conducted on various topics, under which co-housing characteristics, the social values of co-housing, the role of the common facilities within a co-housing project, prevalent common facilities and influencing personal characteristics on preferences.

Subsequently, to study preferences for common facilities among (future) elderly, an evaluation by ranking experiment has been conducted. This ranking experiment was embedded within an online survey, which has been completed by 441 respondents. Within the experiment, fifteen different common facilities were presented to the respondents, whereby they were asked to distill and rank their personal top six out of this list, from most to least preferred. Subsequently, respondents were instructed to repeat this task. However, in the second ranking experiment each common facility was foreseen of its associated costs, whereby these costs had to be taken into account at the evaluation. The costs were based on the total investment costs per common facility and discounted to a monthly contribution per household. After these ranking experiments, respondents were also asked about various socio- demographic characteristics.

By analyzing the respondents' answers by use of a rank-ordered logit model, insights were gained into the preferences for common facilities of the total sample, both without and with consideration of costs. The results indicate that without costs, the most preferred common facility concerns the shared bike parking, followed by the garden with terrace, exercise room, shared car service and the hobby room / atelier. With consideration of costs, the vegetable garden enjoys the highest preference, after which the garden with terrace, shared car service, laundry room and the shared bike parking follow.

Based on these outcomes, it can be concluded that three facilities are of particular importance, namely the shared bike parking, the common garden with terrace and the shared car service. These three facilities appear consistently in the top five most preferred common facilities, both without and with costs, forming the common denominator. Furthermore, with costs taken into account, the vegetable garden and laundry room exhibit a high preference among (future) elderly too.

Moreover, it can also be concluded that preferences for common facilities are influenced by the associated costs per facility. Besides a number of 'stable' common facilities, various shifts in preferences are observable when costs have to be taken into account. The more affordable common facilities – vegetable garden and laundry room – experience a significant increase in popularity with consideration of costs, while the more expensive exercise room drops in popularity. This implies that individuals are (to some extent) sensible to the more affordable facilities. On the other hand, the more expensive shared bike parking, garden with terrace and the shared car service are not subject to price since these remain 'stable' with consideration of costs, indicating a high preference for these facilities. Based on this, it can be concluded that the most affordable facilities do not necessarily enjoy the highest preferences.

In addition, based on various personal characteristics, a number of sub-group analyses have been conducted. Based on these results it can be concluded that household composition and individual's interest in co-housing are of influence on preferences for common facilities within a co-housing project. On the other hand, income, disposal of common facilities in the current housing situation and urbanization degree of living area do not appear to be of influence on preferences for common facilities.

Reflecting on the process, several remarks can be made. First, within the ranking experiment the fifteen common facilities were presented in alphabetical order to the respondents. The question arises whether presenting these facilities in random order would be of influence on the outcomes/preferences. Secondly, various assumptions have been made in determining the monthly costs of the common facilities warranting some remarks. The costs are based on the initial investment costs per facility, whereby the exploitation costs have not been taken into account. Furthermore, these costs are discounted based on a fictive co-housing project comprising 25 housing units. Alternative assumptions would have lead to different costs. Subsequently, this study examined preferences for common facilities, per respondent based on an individual ranking experiment. However, in practice, common facilities within a co-housing project are generally determined by a collective group process. Such an iterative group process could potentially influence individual preferences. In conclusion, the applied bivariate approach on the sub-group analyses could be enhanced by employing a multivariate approach.

A suggestion for further research is to expand the sub-group analyses based on other theme's, such as gender, education level and dwelling type. Furthermore, regarding age, the dataset also includes preferences of individuals aged 49 years and younger. Further analyses can elucidate whether preferences of this age-group align with those of 'future' elderly or deviate. In conclusion, further in-depth research could explore preferences of sub-groups based on a combination of personal characteristics instead of one characteristic, or through a multivariate approach.

All in all, this research has resulted in valuable, practical and applicable insights into how common facilities within co-housing projects are preferred among elderly, and how these preferences are influenced by personal characteristics and the associated costs of these facilities.

SAMENVATTING

Nederland heeft te maken met een (sterk) vergrijzende samenleving en een toenemende 'grijze druk'. Gezien de toenemende en onhoudbare druk binnen de ouderenzorg, zowel met betrekking tot huisvesting als ook beschikbaar personeel, zal er op een nieuwe manier naar deze ontwikkeling/uitdaging gekeken moeten worden. In lijn met de wensen van de nieuwe generatie ouderen wordt daarom sterk ingezet op 'ageing in place', waarbij ouderen zo lang mogelijk zelfstandig thuis blijven wonen. Een woonconcept welke een belangrijke bijdrage in deze uitdagingen kan leveren, is co-housing, wat zich kenmerkt door het feit dat ieder huishouden over zijn eigen 'traditionele' private woning beschikt en één of meerdere faciliteiten gedeeld worden tussen bewoners, om op deze wijze sociaal contact en burenhulp te stimuleren en faciliteren. Co-housing – al dan niet voor ouderen – is een onderwerp wat veelvuldig onderzocht wordt. Echter is er tot op heden nog geen onderzoek verricht naar welke gedeelde faciliteiten binnen een co-housing project de grootste voorkeur genieten onder deze doelgroep. De eventuele invloed van persoonskenmerken, en de bijbehorende kosten van de gedeelde faciliteiten op deze voorkeuren, is daarbij ook een onderbelicht thema.

Op basis hiervan is het onderzoeksdoel te onderzoeken welke gedeelde faciliteiten binnen een co-housing project geprefereerd worden (van hoogste naar laagste voorkeur) onder ouderen, en vast te stellen welke factoren invloed hebben op deze voorkeuren. Al met al luidt de hoofd onderzoeksvraag als volgt: "Welke gedeelde faciliteiten binnen een co-housing project hebben de voorkeur onder ouderen, en welke factoren beïnvloeden deze voorkeuren van ouderen?"

Allereerst is er een literatuuronderzoek verricht naar diverse thema's, waaronder co-housing kenmerken, de sociale waarden van co-housing, de rol van gedeelde faciliteiten binnen co-housing projecten, veelvoorkomende gedeelde faciliteiten en van invloed zijnde persoonskenmerken op voorkeuren.

Vervolgens, om voorkeuren voor gedeelde faciliteiten onder (toekomstige) ouderen te onderzoeken, is gebruik gemaakt van een rangschikkingsexperiment. Dit experiment is verwerkt in een online enquête, welke door 441 respondenten is ingevuld. In het rangschikkingsexperiment werden aan respondenten vijftien verschillende gedeelde faciliteiten getoond, waarna gevraagd werd hier hun persoonlijke top zes uit te destilleren en deze te rangschikken van hoogste naar laagste voorkeur. Aansluitend diende deze opdracht herhaald te worden. Echter waren de gedeelde faciliteiten bij dit tweede rangschikkingsexperiment voorzien van een maandelijkse kostprijs, welke meegenomen diende te worden in de afweging. Deze kostprijzen zijn gebaseerd op een totaal investeringsbedrag (stichtingskosten) per faciliteit en verdisconteerd naar een maandelijkse bijdrage per huishouden. Na deze twee rangschikkingsexperimenten werden respondenten ook gevraagd naar een aantal sociaal- demografische kenmerken.

Door het analyseren van de antwoorden van de respondenten middels een rank-ordered logit model is inzicht verkregen in de voorkeuren voor gedeelde faciliteiten van de totale sample, zowel zonder als met inachtneming van kosten. De resultaten laten zien dat zonder kosten de meest geprefereerde faciliteit de gedeelde fietsenstalling is, gevolgd door de tuin met terras, sportruimte, deelauto service en de hobbyruimte. Met inachtneming van kosten geniet de groentetuin de hoogste voorkeur, waarna de tuin met terras, deelauto service, wasruimte en gedeelde fietsenstalling volgen.

Op basis van deze resultaten kan geconcludeerd worden dat drie faciliteiten met name van belang zijn, namelijk de gedeelde fietsenstalling, de gedeelde tuin met terras en de deelauto service. Deze drie faciliteiten komen immers terug in zowel de top vijf meest geprefereerde faciliteiten zonder als ook mét

kosten, en vormen hiermee dus de gemene deler. Daarnaast, met inachtneming van kosten, genieten ook de groentetuin en wasruimte een hoge voorkeur.

Daarnaast kan ook geconcludeerd worden dat voorkeuren voor gedeelde faciliteiten beïnvloed worden door de bijbehorende kosten per faciliteit. Naast een aantal 'stabiele' gedeelde faciliteiten, zijn er een aantal verschuivingen in voorkeuren waarneembaar, wanneer de kosten mee in ogenschouw genomen (moeten) worden. Betaalbaardere faciliteiten – groentetuin en wasruimte – stijgen sterk in populariteit, met inachtneming van kosten. Daarentegen daalt de duurdere sportruimte in juist voorkeur. Dit impliceert dat personen (tot in een bepaalde) mate gevoelig zijn voor de meer betaalbaardere faciliteiten. Aan de andere kant zijn de kostbaardere gedeelde fietsenstalling, tuin met terras en deelauto niet onderhevig aan prijs, aangezien deze 'stabiel' blijven met inachtneming van kosten, wat een hoge mate van voorkeur aantoont. Op basis hiervan kan geconcludeerd worden dat personen niet direct de hoogste voorkeuren geven aan de meest betaalbare faciliteiten.

Daarnaast zijn op basis van bepaalde persoonskenmerken ook een aantal subgroep analyses uitgevoerd. Op basis van deze resultaten kan geconcludeerd worden dat de persoonskenmerken 'huishoudsamenstelling' en iemands interesse in co-housing van invloed zijn op voorkeuren voor gedeelde faciliteiten binnen een co-housing project. Daarentegen lijken inkomen, stedelijkheidsgraad van iemands woonomgeving, en het wel of niet beschikken over gedeelde faciliteiten in de huidige woonsituatie niet van invloed op voorkeuren voor gedeelde faciliteiten.

Terugkijkend op het proces, zijn er een aantal kanttekeningen te maken. Allereerst, de vijftien gedeelde faciliteiten zijn binnen het experiment op alfabetische volgorde aan de respondenten gepresenteerd. De vraag rijst of het van invloed is op de uitkomsten/voorkeuren, indien de vijftien faciliteiten in willekeurige volgorde aan de respondenten gepresenteerd werden. Ten tweede zijn diverse aannames gedaan bij het bepalen van de maandelijkse kosten van de gedeelde faciliteiten, waarbij kanttekeningen geplaatst kunnen worden. Zo zijn deze kosten gebaseerd op de initiële investeringskosten per faciliteit, en zijn exploitatiekosten buiten beschouwing gelaten. Daarnaast zijn deze kosten verdisconteerd op basis van een fictief co-housing project bestaande uit 25 woningen. Andere aannames zouden resulteren in afwijkende maandelijkse kosten. Tevens zijn binnen dit onderzoek de voorkeuren per respondent onderzocht op basis van een individueel rangschikkingsexperiment. Echter worden gedeelde faciliteiten binnen een co-housing project in de praktijk meestal op groepsbasis vastgesteld. Een dergelijk groepsproces zou van invloed kunnen zijn op individuele voorkeuren. Tot slot zou de toegepaste bivariate analyse aanpak, met betrekking tot de subgroepen, verbeterd kunnen worden middels de toepassing van een multivariate aanpak.

Een suggestie voor vervolgonderzoek is het uitbreiden van de subgroep analyses op basis van overige thema's, zoals geslacht, onderwijsniveau en iemands woningtype. Wat betreft leeftijd, bevat de dataset ook voorkeuren van personen van 49 jaar en jonger. Toekomstige analyses zouden inzichtelijk kunnen maken of voorkeuren van deze groep aansluiten bij die van toekomstige ouderen of juist afwijken. Daarnaast zou verdiepend onderzoek verricht kunnen worden naar voorkeuren van subgroepen op basis van een combinatie van persoons kenmerken, of middels een multivariate benadering.

Alles tezamen heeft dit onderzoek geresulteerd in waardevolle, praktische en toepasbare inzichten in welke gedeelde faciliteiten binnen co-housing projecten geprefereerd worden onder ouderen, en hoe deze voorkeuren beïnvloed worden door persoonskenmerken en de bijbehorende kosten van deze faciliteiten.

TABLE OF CONTENT

1. INTRODUCTION

In this chapter, the background and context followed by the problem statement are discussed, on which this research is based on. Additionally, the research goal and research questions follow which are central to this research. Subsequently, the scope and limitations, and the relevance are addressed. Finally, the structure of this research and report will be described within the reading guide.

1.1. BACKGROUND AND CONTEXT

A global and contemporary topic which is off great importance, is the strongly ageing population on a global and European level. On average, people's life expectancy increased from 64 years in 1990, to 73 years in 2019 (United Nations, 2022). Herewith, it is expected that on a global level the share of the population aged above 65 years, increases from 9% in 2019 to 17% in 2050 and even towards 24% in 2100 (United Nations, 2019; Scott, 2022; Roser & Rodés-Guirao, 2019). Within Europe, it is forecasted that the share of people aged above 65 years increases from 21% in 2022, towards over 30% by the end of the century (Eurostat, 2023; World Economic Forum, 2022).

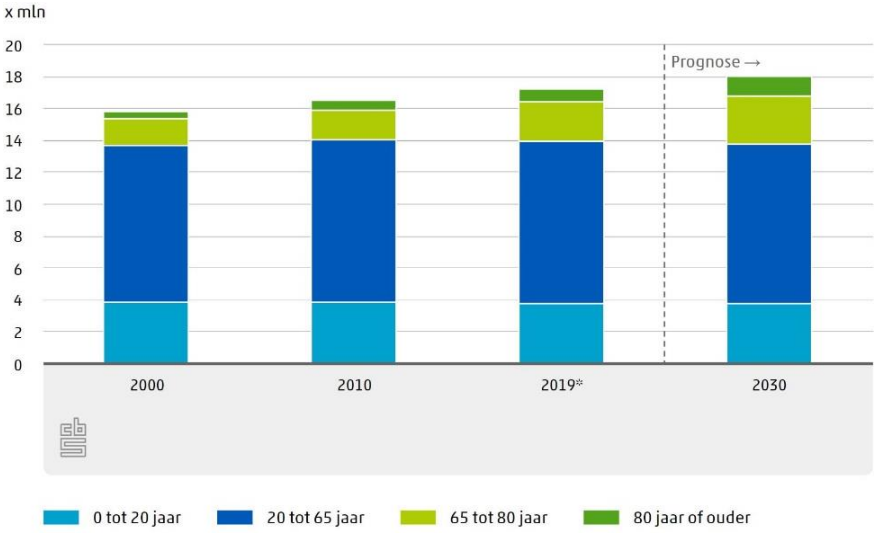

Figure 1.1: Development of Dutch population by age between 2000 and 2030 (CBS, 2018).

Also the Netherlands has to deal with this tendency. At the beginning of 2022, 20% of the Dutch population had an age of 65 years or older, while this number was only 12% in 1990 (CBS, 2022b). Looking forward, it is forecasted that in 2035 almost a quarter of the Dutch population is aged 65 years or older (Planbureau voor de Leefomgeving, 2022). This national ageing trend is visualized in figure 1.1. Obviously, there are regional outliers which have to deal with an above or below average ageing society. In various municipalities in Limburg, Zeeland, Groningen and de Achterhoek the population proportion of elderly already exceeds 27%. On the other hand, the share of people aged above 65 years is below average in the central and western parts of the Netherlands (CBS, 2023a).

Looking at the elderly care sector, elderly care institutions indicate they will not be able to manage this future ageing population. Not only because of a lack of elderly nursing homes, but mainly as a result of a significant shortage in workforce to operate these nursing homes (Ligtvoet, 2022; ActiZ, 2022). For 2023, the staff shortage within the overall Dutch care sector comes down at 56.000 employees and this deficit is at risk of increasing to 155,000 employees in 2032 (RTL Nieuws, 2023).

Based on these trends and challenges, the Dutch government, as well as the elderly care sector, increasingly steer on 'ageing in place' – which is also in line with the wishes and demands of the contemporary senior (Ministerie van Volksgezondheid, Welzijn en Sport, 2018; Sociaal Cultureel Planbureau, 2021; Market Response, 2020; Rusinovic et al., 2019). The new generation elderly are namely often strongly attached to their home, whereby living independently and ageing in place contributes to positive feelings of autonomy, personal freedom and individuality (Rusinovic et al., 2019). Hereby the term 'ageing in place' is referred to as the possibility for elderly to live as long as possible independently in their own (rental or owner occupied) dwelling, without the need of caregiving (Harreman et al., 2020).

1.2. PROBLEM STATEMENT

A parallel trend which contributes to an ageing society is the fact that elderly are getting older. Where people in 1950 reached an average age of 71.4 years, this number increased to 77.0 in 1990. Nowadays, the life expectancy of Dutch males is 79.7 years and for females 83.0 years. So, overall, the average life expectancy rose with 10 years during the last 70 years (VZ info, 2022). Considering those developments, the ratio between younger and older generations rapidly increases in the coming years. A commonly used ratio which implies this phenomenon, is the 'old age dependency ratio', which concerns the ratio between the number of elderly at an age they are economically not active anymore, compared to the number of working people (Eurostat, 2018). For the Netherlands, this ratio comes down to 34% in 2022, which means there are three working people on one retired senior. However, this percentage will rapidly increase in the coming years to nearly 50%, as shown in figure 1.2 (CBS, 2023b).

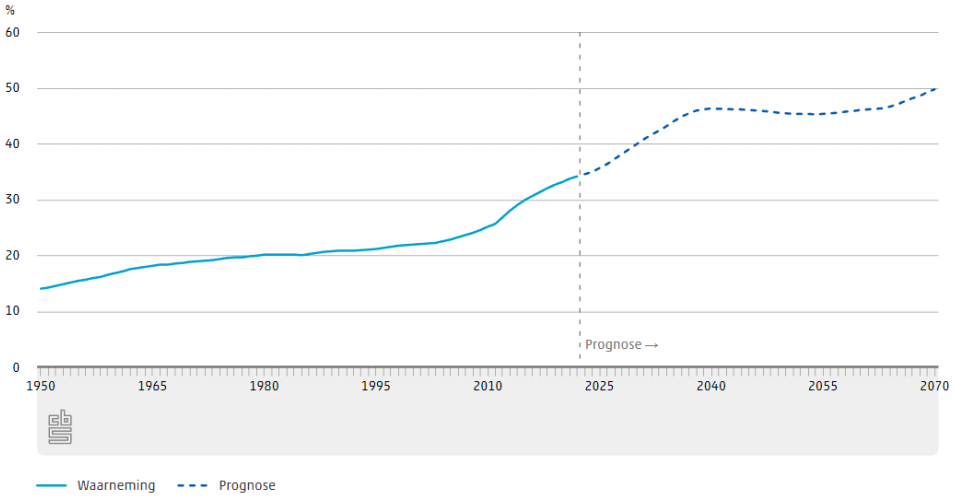

Figure 1.2: Past, current and future old age dependency ratio within the Netherlands (CBS, 2022).

The most significant and important effects of this growing ratio, can be found in the elderly (health) care sector (RIVM, 2019; Ministerie van Volksgezondheid, 2018). At the moment, this sector has to deal with ever-growing work pressure, due to the growing number of elderly while the number of elderly care workers will decline with 30%, because of retirement and a lack of new growth (De Wee, 2022). This challenge is not only a future problem, but roots itself already in the current healthcare sector as the waiting list for an elderly nursing home accommodation exceeded 21,000 requests in 2022 (ActiZ, 2022). However, building extra nursing and retirement homes is not the solution as there is simply not enough personnel to operate those care homes (Ligtvoet, 2022). In addition, the pressure on the current healthcare workers is considered as much too high. In 2022, no less than 52% of the people who

are active in the elderly care sector state that they perceive their work pressure as (much) too high (CBS, 2022a). All in all, this can be considered as an unsustainable and untenable situation for the elderly care sector, as well as for the entire Dutch society.

Taking these phenomenon all together, the ageing in place approach is a needed and justifiable solution path: elderly should live longer independently, and as mentioned, the Dutch government already steers on this approach in various policy documents (Ministerie van Volksgezondheid, Welzijn en Sport, 2018). Equally, this viewpoint is justifiable since the majority of elderly also want to live as long as possible independently in their own dwelling (Ministerie van Volksgezondheid, Welzijn en Sport, 2018; Sociaal Cultureel Planbureau, 2021; Market Response, 2020, Rusinovic et al., 2019).

What is more, elderly do not only want to live longer independently, they are also able to, as they stay healthy for longer than ever before. Of the Dutch people aged between 65 and 74 years old, 77% is still in a very good health condition. For the elderly aged between 75 and 84 years this share is 55% and for seniors of 85 years or older this comes down at 32% (Daalhuizen et al., 2019; Leidelmeijer, 2018). Furthermore, IJsselstein (2013) states that the new generation elderly are more vital, mobile, active, higher educated and wealthy than ever before, which also strongly contributes to independent ageing. Nevertheless, it is inevitable that mental and physical well-being deteriorate while ageing – in varying degrees – and so a lifetime compatible dwelling and living environment are necessary to facilitate and stimulate ageing in place (Kat, 2019).

Besides the fact that ageing in place is needed and is justifiable, it comes with various positive aspects for the individuals who have and/or want to age in place. Wiles et al. (2011) state that ageing in place enables seniors to maintain a higher level of independence, autonomy, social contacts and social support. Furthermore, Sixsmith and Sixsmith (2008) conclude that ageing in place contributes to the fact that seniors can remain living at the place they are attached to, and to an increase in healthy ageing, independence, well-being and personal control. However, a significant risk which comes with ageing in place is loneliness (Arias-Merino et al., 2019; Sixsmith & Sixsmith, 2008). Within the Netherlands, 33% of the people aged above 75 years feels somewhat lonely and 9% feels very lonely. Overall, this social phenomenon occurs on a broad level among elderly, but especially among seniors who are widowed or who live alone (Yang et al., 2022; CBS, 2020a).

A housing concept which already exists for a number of decades, rises in popularity and can strongly contribute to the just mentioned challenges regarding an ageing society, growing pressure on the (elderly) care sector, ageing in place, loneliness among elderly and creating a social living environment, is ‘co-housing’ (Bakker, 2009; Kvietkute & Hauge, 2022; Van den Berg et al., 2021; Rusinovic et al., 2019; Hudson, 2017). This distinctive housing form is characterized by the fact that each resident/households has its own private dwelling, but with one or multiple common facilities (common spaces), which stimulate, facilitate and provide opportunities for social ties, social contacts and mutual help among residents (Van den Berg et al., 2015). Research found that these co-housing environments, with their associated common facilities, contribute to a high degree of social cohesion and social participation (Van den Berg et al., 2021; Kvietkute & Hauge, 2022; Meltzer, 2005). To illustrate, Fromm (2000) concludes that residents in co-housing environments experience over 400% more social interactions and contacts, compared to traditional housing environments. Moreover, within senior co-housing projects, a substantially higher standard of mutual help and neighbor support is reported, which contributes to ageing in place and enlightens need for assistance (Rusinovic et al., 2019; Glass, 2009; Rodman, 2013). Furthermore, counteracting/preventing loneliness (Weijs-Perrée et al., 2015), higher neighborhood and living

satisfaction (Dassopoulos & Monnat, 2011) and a greater degree of well-being and quality of life (Cramm & Nieboer, 2015; Friedman et al., 2012) are mentioned as significant benefits of co-housing projects. The study of Rusinovic et al. (2019) on the experiences of Dutch elderly co-housing residents concludes that those residents also confirm these advantages, based on practice and their own living experience, which emphasizes these benefits.

Within the field of co-housing – whether or not related to elderly – extensive research has been carried out with respect to the social, sustainable and motivational aspects of co-housing. Also, living experiences and housing satisfaction of co-housing residents are investigated, even as costs aspects. A much addressed item are the common facilities, of which it is stated that these are the mainstay of co-housing concepts, and deliver an essential contribution regarding the social and communal character, offering mutual help, counteracting loneliness and improve quality of life.

However, those common facilities are talked about as 'container term' whereby in some cases examples of typical common facilities are mentioned – such as a shared garden, kitchen and living room. Current studies state that common facilities are highly valued by co-housing residents and play an essential role in creating these housing environments with a high level of social cohesion and a sense of community. However, there is no insight in which specific common facilities within a co-housing project are most preferred by elderly. Herewith, a detailed understanding of the preferences of elderly regarding types of common facilities is absent.

Furthermore, research states that common facilities increase the total investment costs of a co-housing project, and thus the costs/price per dwelling (Scanlon and Arrigoitia, 2015, Sayers, 2023; Kozeny, 2005; Garciano, 2011; Rodman, 2013). Nevertheless, the effect of the associated costs of common facilities on preferences for these facilities, is an underexposed topic too, while behavioral economic studies conclude that preferences and the ranking of attributes are affected, when choice alternatives are provided with a price attribute (Carlsson et al., 2007). Making the translation to practice, it appears that at the very beginning, initiators of a co-housing project are often open minded towards which common facilities to include. However, when financial considerations arise, compromises are frequently made. A Dutch national financial instrument which should contribute to the reduction of these compromises, is the subsidy scheme for common facilities in elderly housing projects (in Dutch abbreviated by SOO). This subsidy should (financially) contribute to the realization of qualitative common facilities in elderly housing projects, from the perspective of stimulating and facilitating encounters and social interactions (RVO, 2024).

Likewise, to date, no research has been conducted on the influence of personal characteristics on preferences for common facilities, despite studies indicating that housing preferences vary among various socio-demographic groups, or that individuals characteristics correlate with housing preferences (Li et al., 2021; Beamish et al., 2015; Vrieler & Ter Heegde, 2018). Also, examples from practice exist where it seems that certain co-housing projects 'pre-sort' for or aim at particular socio-demographic groups/ personal characteristics, including gender, age, household composition and income (Hussmann, 2019; UK Cohousing Network, 2021; Community Led Housing, 2024; FNF Co-living, 2024).

Lastly, in recent years an increasing number of Dutch municipalities and provinces express the ambition to pay more attention to the development and realization of new and distinctive housing concepts – including co-housing – given the ageing society and the various social and societal benefits of these concepts (Companen, 2016). However, despite co-housing already exists for a number of decades and

is increasingly brought to the attention, it remains a housing concept that is encountered to a limited extent in practice (Tummers, 2015). Herewith, the question raises whether this is the result of co-housing projects that do not adequately align with the wishes and preferences of consumers.

1.3. RESEARCH OBJECTIVE

Following, the research objective is to identify what common facilities within a co-housing project are preferred among elderly, and to determine which factors influence these preferences.

With the generated outcomes, various insights will be obtained. First, insight will be gained in the clear/ initial preferences for common facilities within co-housing projects among elderly (so without the consideration of the associated costs of those facilities). Secondly, by studying preferences adjusted for costs too, these outcomes provide an understanding of whether preferences for common facilities are affected by the associated costs of these facilities. In other words: Do people have a different preference with respect to common facilities, when their associated costs have to be considered? This can be perceived as the most valuable outcome, since the additional costs of the common facilities will always have to be recouped. The disparity between preferences without and with costs is considered as beneficial since preferences without costs represent the initial preferences, while comparing these with preferences with costs provides insight into the influence of costs. Furthermore, these findings hold significant value for initiators or co-housing projects, and give in advance insight into (potential) compromises due to costs considerations.

Following, exploring the correlation between socio-demographic characteristics and preferences for common facilities, contributes to obtain valuable insight too, regarding preferences for these facilities. For privately initiated co-housing projects, a first substantiated assumption can be made concerning the most preferred common facilities of the private initiators and additional future residents. Furthermore, (semi) commercial parties (like a housing association and professional real estate investors) can use these outcomes to better align their products with the housing wishes and demands of their intended target group, with their associated socio-demographic characteristics.

1.4. RESEARCH QUESTIONS

The main research question, following from of the research goal and knowledge gap, reads as follows:

> " What common facilities within co-housing projects are preferred among elderly, and what factors influence these preferences of elderly? "

The sub-questions which arise from the main question are as follows:

1) What are prevalent common facilities among existing elderly co-housing projects?
2) What is the influence of the associated costs of common facilities on the preferences for these facilities within co-housing projects among elderly?
3) Which personal characteristics influence the preferences for common facilities within co-housing projects among elderly?

1.5. SCOPE AND DELIMITATIONS

This research focusses on elucidating the preferences of elderly regarding common facilities within co-housing projects. According to Market Response (2020) and Vrieler and Ter Heegde (2018), the popularation group of 'elderly' is more diverse than ever before, wherewith it is essential to delineate this target group. According to CBS (2023a), individuals aged 65 and above fall into the age category of 'elderly'.

Nevertheless, to ensure the value and applicability of this research and the outcomes in the medium and long term, insight into the preferences of 'future' elderly will be gained too. For the operationalization of this demographic group, the age categorization as established by Tebbens and Vonk (2022) is maintained, who classify adults into the following categories: adolescence (19 – 25 years), adults (26 – 40 years), middle-aged adults (41 – 50 years), 50 plussers (50 – 64 years) and elderly (65 years old and over). To demarcate the age group 'future' elderly, the age group of 50 plussers is adopted, preceding to the elderly age category. All in all, this results into a targeted research group with an age between fifty and eighty years. These individuals form the 'unit of analysis' within this research.

Another rationale for including 'future' elderly in this research, arises from the observation that individuals aged in their fifties, show an above average willingness and interest to move, caused by two life changing events; the children who leave the house and the gradual approach of retirement (Vrieler & Ter Heegde, 2018). Moreover, although adults and elderly are healthier and more active than ever before (IJsselstein, 2013), from an age around their fifties, individuals become increasingly aware of the fact that they get more vulnerable as they grow older, and that they have to become more self-reliant (Market Response, 2020). Taking this into account, the desire for a lifetime compatible dwelling and supporting living environment increase (Vrieler & Ter Heegde, 2018; Market Response, 2020).

1.6. SCIENTIFIC AND PRACTICAL RELEVANCE

At the core of every research lies the requirement that it should contribute to both scientific and socio-practical domains. Below a discussion on the scientific and practical relevance follows.

1.6.1. Scientific relevance

To date, extensive research has been conducted on the various social and societal benefits of co-housing projects and its associated common facilities. Though, 'common facilities' are mostly mentioned as a container term whereby indicated that these fulfill an essential and connecting role within co-housing projects, and that co-housing residents attach great value and importance to these shared facilities. This research will contribute on a scientific level to the topic of common facilities, by investigating what common facilities are preferred within co-housing projects among elderly. Herewith, the general statement that 'common facilities are highly preferred and valued by co-housing residents' will be further deepened and peeled off. Additionally, the influence of the associated costs of these common facilities and the influence of personal characteristics on these preferences will be investigated too, since residential preferences can namely systematically differ across socio-demographic groups (Van Dijk & Van Rooij, 2022). Furthermore, costs form a major component in defining the scope of a housing project, and housing preferences are influenced by these costs (Vrieler & Ter Heegde, 2018).

1.6.2. Practical relevance

Co-housing is a housing concept which rises in popularity and of which more projects are getting initiated (Bakker, 2009; Tummers, 2016), wherewith the relevance of this housing concept emerges. This

study aims at identifying what common facilities within co-housing are preferred among elderly, and obtain insight into the influence of costs and personal characteristics on these preferences. Fundamentally, this allows to align co-housing projects with the housing wishes and requirements of (future) residents and to potentially tailor these projects more specifically to certain resident profiles. Overall, this should contribute to residents' housing satisfaction (Stewart, 2009). Furthermore, co-housing projects that better align with the housing wishes of its future elderly residents have the potential to attract and inspire this demographic group to relocate to such a housing concept. In turn, this could have a positive impact on the potential for ageing in place, the elderly dependency ratio and the pressure on the elderly care sector. Another practical aspect to which this research contributes, is the fact that co-housing is a rather expensive housing concept due to the common facilities (Scanlon & Arrigoitia, 2015). Herewith, it does not directly contribute to the realization of the proposed and required affordable dwellings within the Netherlands (Rijksoverheid, 2023). By investigating the influence of the associated costs on preferences for common facilities, co-housing projects may potentially be realized more efficiently towards the preferences of their (future) residents. On the whole, this should contribute towards greater affordability and efficiency, without affecting the positive stimuli of common facilities.

1.7. READING GUIDE

This research is divided into five chapters. Below, a concise description follows on the structure of this thesis, as well as the separate chapters.

Chapter 2: Theoretical framework

Chapter two covers the theoretical framework, in which relevant (scientific) literature and information within the context of this research are addressed. It discusses the characteristics of co-housing, diverse topics regarding common facilities within co-housing projects and (personal) influencing characteristics on preferences.

Chapter 3: Research plan

Subsequently, chapter three addresses the research plan. In addition to the conceptual model, the research and analysis method are discussed in this chapter. Furthermore, an extensive explanation is devoted to the questionnaire design, the population and method of data acquisition.

Chapter 4: Results

Next, chapter four discusses the results of the research. Firstly, the characteristics of the respondents are debated as well as the response rate. Subsequently, the results of the total sample are discussed, followed by the results of several sub-group analyses.

Chapter 5: Conclusions and recommendations

In the last chapter the conclusion follows whereby the main research question is answered. Moreover, a discussion on the results is given, as well as a reflection regarding the research process. Lastly, some practical recommendations and recommendations for further research follow.

2. THEORETICAL FRAMEWORK

Within the theoretical framework, important concepts, definitions and theories will be addressed with respect to the topic of research. Herewith, this forms the foundation for the operationalization of the research. The topics that will be discussed include the characteristics of co-housing, common facilities within co-housing projects, and essential variables as input for the actual research.

2.1. CHARACTERISTICS OF CO-HOUSING

Co-housing grows in popularity and interest among different (market) parties, involved in the housing market, as it is considered as a future proof housing concept, anticipating on societal challenges, among which an ageing society (Williams, 2005a; Hessellund, 2020; Pedersen, 2015; Butot, 2017; Labit, 2015; Felix, 2019). Herewith, the interest in co-housing also grows within the scientific (research) field. However, there does not seem to be a clear consensus within literature regarding the definition of co-housing (Sandstedt & Westin, 2015). Consequently, this sub-chapter will discuss the characteristics of co-housing, its vision and (social) values, followed by a paragraph related to the definition.

2.1.1. Co-housing characteristics

First, the characteristics of co-housing will be discussed to provide insight into the concept and its context. On average, various forms of 'collective housing' are often referred to with the umbrella term 'co-housing' whereby co-housing is commonly explained as a housing concept with a great degree of collectivity, solidarity and cooperation between residents, in comparison with traditional housing (Butot, 2017). In a well-known and frequently mentioned study conducted by Vestbro and Horelli (2012) where the history and the development of co-housing are discussed, co-housing and various derived housing forms have been defined (see table 1 for an overview).

Table 1: Proposed definitions for different types of collective housing (Vestbro & Horelli, 2012).

Co-housing	"housing with common spaces and shared facilities"
Collaborative housing	"housing that is oriented towards collaboration among residents"
Collective housing	"housing with emphasis on the collective organization of services"
Communal housing	"housing designed to create community"
Commune	"housing without individual apartments"

Subsequently, Williams (2005b) describes co-housing as "a housing form that combines the autonomy of private dwellings with the advantages of community living. It has private units, semi-private spaces and indoor and outdoor communal spaces. It is built at low, medium and high densities and in a variety of layouts and locations; thus, communities are very diverse." With respect to the characteristics of co-housing, various perspectives occur in literature. In a research on the integration of co-housing in the Belgian living and housing culture, Devloo (2013) mentions four characteristics, namely participatory process, intentional neighborhood design, private homes supplemented by extensive common facilities and complete residential management. On the other hand, Beck (2020) makes a distinction between four dimensions of co-housing; a vision and value-oriented dimension, organizational dimension, relational dimension and the physical dimension.

Furthermore, the extensive bookwork of McCamant and Durrett (2011) on creating co-housing – which has affected the literature field of co-housing significantly – distinguishes six co-housing characteristics. These six components will be used to describe the characteristics of co-housing below, whereby the first four are extensively described and the final two are more concise – in line with the description/discussion of McCamant and Durrett (2011). However, important to mention is that these six characteristics are not universal. In an extensive research on contemporary co-housing in Europe, Hagbert et al. (2020) concludes that the characteristics and culture of co-housing projects vary per country, based on different political, economic and cultural contexts.

1) Participatory (design) process

According to McCamant and Durrett (2011), one of the main characteristics of co-housing, is the active participation of the (future) residents during the entire project development; from the concept and design phase, through construction. In general, a co-housing project is initiated by six to twelve families who are responsible for contracting an architect (and other advisory parties), establishing the desired program and plan, finding a suitable location/site, and seek other interested people. The entire process of developing the project can last long and ask for the necessary energy and patience. Although, as the process is part of the final product, it is found that being collectively involved during the entire development and design process, in the end results in a higher level of social cohesion and a sense of community between (future) co-housing residents (Bosman, 2008; McCamant & Durrett, 2011; Tummers, 2015; Marckmann, 2009; Jarvis, 2015). Furthermore, Van der Wielen (2017) suggests a positive relation between the intensity and duration of involvement during the development and design process, and the level of neighborhood cohesion between (future) neighbors.

McCamant and Durrett (2011) add that co-housing projects can be developed from different methods of approach; from complete self-organized projects, to projects whereby the group of residents are led by a consultant/management firm, to cases whereby the initiators collaborate with a (non-profit) market party. However, in all these forms, the residents will have a leading and decision-making role. These cases whereby the residents are the initiating party, are also referred to as a CPC project (Devloo, 2013; Durrett, 2009). On the contrary, others state that co-housing projects can also be initiated and developed by a third party, such as a project developer or housing association, which is increasingly common (Hessellund, 2020; Pirinen, 2016; Felix, 2019; Beck, 2020). This is also reflected in the fact that there are more and more commercial parties that are specialized in the development of co-housing projects. One of these parties is Cohousing Projects (n.d. -b), who state that “nowadays a lot of people want to ‘co-house’ but not ‘co-build’”.

2) Designs that facilitate community

A second characteristic of co-housing projects, is its physical environment – design and layout – which encourages and facilitates a strong sense of community and ‘intimate’ neighborhood atmosphere. Furthermore, the plan should allow for causal and informal interactions between residents. While the participatory design process is the first step in establishing a sense of community, the physical design is of great importance in perpetuating the community feeling. On the other hand, privacy and autonomy are aspects which also should be ensured – among others by the principle that each household has their own private dwelling (McCamant & Durrett, 2011; Williams, 2005b; Jarvis, 2015).

In literature, various design aspects are mentioned to increase possibilities for social contacts and facilitate the community. Williams (2005b) and Riedy et al. (2017) mention above average building densities as design principle, since these result in shorter walking distances and more proximity between residents. In a study on residential preferences of elderly on co-housing, Felix (2019) addresses a number of preferences regarding the physical characteristics of a co-housing project. With respect to the form, a residential courtyard was found as most preferred, which is line with the findings of Duivenvoorden and Hagen (2022) and Hoetjes (2022). Furthermore, the size of the co-housing project is of great importance for the community feeling. As a general rule, larger communities result in more anonymity and so in less social cohesion (Mellen & Short, 2022; Williams, 2005b). On the other hand, McCamant and Durrett (2011) state that (too) small co-housing projects do not work well socially, and get too expensive since costs for common facilities are divided over only a small number of dwellings. A suitable and proper scale starts from a medium of approximately 25 housing units. In addition, the research of Glass (2013) states that the ideal size of a co-housing project lies between twenty and thirty dwellings, and Ossokina et al. (2019) concludes that projects with a size of around 20 dwellings are highest valued by elderly residents. The importance of car parking at the periphery of the site is added as important design principle too (Devloo, 2013; Williams, 2005b; McCamant & Durrett, 2011), as car free environments – with informal meeting places – allow residents to go outside more often. Herewith, spontaneous encounters occur more frequently. Last, good visibility of the common facilities and of the (semi-) private and public areas is an essential design principle in creating co-housing (McCamant & Durrett, 2011; Riedy et al., 2017).

Assuring privacy and autonomy within the communal environment is one of the points of attention for co-housing projects, as mentioned above. With respect to the balance between privacy and autonomy on the one hand and collectivity and social interaction on the other hand, for Dutch co-housing projects it can be stated that – although Dutch co-housing residents choose for a social living environment – they place a high value on privacy and autonomy. This can be illustrated by the fact that Dutch co-housing residents desire a self-contained dwelling – preferably with a private outdoor area – where they can recuse themselves when desired, but within a social and shared living environment where they have the possibility to seek each other (planned or spontaneously), plan activities together and experience social contacts (De Vos & Spoormans, 2022; Bakker, 2009). Regarding the level of social cohesion in Dutch elderly co-housing projects, Felix (2019) concludes that elderly prefer a community whereby residents occasionally organize activities together, on a voluntary basis.

3) Extensive common facilities

The third and probably most representative pillar for co-housing projects, is the presence of extensive common facilities, which are considered as cornerstone and 'social heart' of co-housing environments. In a co-housing project, each household disposes of their own private dwelling (rental or owner occupied) wherewith the common facilities are really an extension on this private dwelling (McCamant & Durrett, 2011; Tummers, 2017; Devloo, 2013). McCamant and Durrett (2011) state that common facilities (common spaces) create the setting for social activities such as common dinners, Sunday morning brunch, yoga, a Friday night movie and periodic (owners association) meetings. Furthermore, common facilities also provide opportunities for more practical functions, such as a workshop room or a shared laundry facility, or more luxurious functions like a swimming pool, exercise room or wellness. Subsequently, the idea is that private dwellings can be reduced in size, in order to collectively invest in comprehensive shared facilities (Beck, 2019). The extent to which common facilities are used, depends on

how well the residents' interests, wishes and demands have been translated in the actual project during the concept and design phase. When this is facilitated well, the common facilities will be used intensively and play an essential role within the co-housing community (McCamant & Durrett, 2011). To enhance the (positive) effects, Williams (2005b) adds that the common facilities should be of good quality, clearly visible, multifunctional of use, and adjustable if the groups' wishes and demands change overtime. Additional information with respect to the definition and role of common facilities follows in sub-chapter 2.2.

Looking at the presence and role of common facilities in Dutch co-housing projects, the use of these facilities is more aimed towards spontaneous interactions, instead of planned and organized activities, which makes Dutch co-housing somewhat more individualistic compared to other frontrunning countries (Labit, 2015). Furthermore, De Vos and Spoormans (2022) state in their comparative analysis that the disposal of common facilities is one of the motivations for Dutch people to choose for co-housing, with the perspective that those facilities are much better affordable by sharing them.

4) Complete residential management

The fourth co-housing characteristic mentioned by McCamant and Durrett (2011), is complete residential management. Also Devloo (2013) and Brenton (2013) report that after completion – during the 'exploitation' of the project – residents are responsible for the functioning of their co-housing community. In general, important decisions are made by the group at common meetings, which are organized on a regular (e.g. monthly) basis. Other, minor decisions can be made in smaller committee meetings, which also provide opportunities for discussion and solving other 'problems' (Beck, 2019; McCamant & Durrett, 2011; Vedel-Petersen et al., 1988). Another aspect of residential management, are so called working groups, which take responsibility for various tasks such as general maintenance, maintain the garden and financial accounting. Other tasks/duties – such as preparing dinner and organizing activities – are in general rotating. By the residential management system, problems cannot be blamed or passed towards outsiders. Herewith residents have to take responsibility together. For example, if the buildings are not maintained property, the community will bear the costs of repair. Another, more social example is that when group members do not organize common activities anymore, 'everybody loses' – according to McCamant and Durrett (2011) and Devloo (2013).

5) Non-hierarchical structure

The fifth co-housing characteristic, which is only concisely described by McCamant and Durrett (2011), concerns a non-hierarchical structure. This represents the fact that the co-housing community is jointly responsible for decisions. Individuals within the collective project may have outspoken opinions with respect to certain issues, but at the end the community in total is collectively responsible for decisions. By this means, the community does not depend on a single individual, but the groups' interest comes in first place.

6) Separate income sources

The sixth and final co-housing characteristic described by McCamant and Durrett (2011), are its separate income sources. The financial structure of a co-housing project is to a large extent comparable to the economics of an average condominium project whereby every household is responsible for their own income and financial budget, to develop – or purchase a dwelling within – the co-housing project.

In case of a CPC project, future residents have to search together for financial assumptions and (design) principles, which are acceptable and financially bearable for each member of the group. All in all, this concerns an iterative group process. Subsequently, during the 'exploitation' of the co-housing project, every household has to pay a monthly fee to maintain and operate the communal facilities (McCamant & Durrett, 2011; Tummers, 2017).

A unique combination

In conclusion, McCamant and Durrett (2011) state that these six characteristics – a participatory design process, a design that facilitates the community, the presence of extensive common facilities, complete residential management, a non-hierarchical structure and separate income sources – define the concept of co-housing. Moreover, it is added that each of these characteristics is not necessarily unique, but the combination of these six is. In addition, each characteristic has their own application and builds upon the other five, which results in the success of the whole.

2.1.2. The vision and (social) values of co-housing

Following the description of the characteristics of co-housing in the previous paragraph, this paragraph provides an explanation on the vision and (social) values of co-housing for its residents, to further outline the context of and idea behind co-housing. In general, housing projects are increasingly emerging from a thoughtful vision and concept (Peek & Gehner, 2018), which is even from greater importance when developing a co-housing project. A set of jointly supported core values is namely essential in the establishment of a well-functioning co-housing community (Jarvis, 2015). According to Beck (2020), the most essential vision of a co-housing project is to connect privacy and collectivity, so that residents live together in a social housing environment, while disposing of their private dwelling. Another vision of co-housing projects, is establishing a good, qualitative and safe living environment for children to grow up (Manzanti, 2007; Marckmann, 2009) or live sustainable and self-sufficient in the context of material use, energy generation and food (production) (Marckmann, 2009; Tummers, 2017). Moreover, a small proportion of co-housing projects are based on spiritual, religious and/or political values (Beck, 2020; McCamant & Durrett, 2011). However, according to Sargisson (2012), co-housing is not an extremely distinctive housing form that 'challenges' society; it is a housing concept for individuals who search for a 'better housing alternative', with an emphasis on social and communal aspects. Also Tummers (2017) and Beck (2020) state that co-housing environments offers opportunities for people who prefer a different way of housing, with the social dimension as an overarching value.

Considering literature, this social housing environment pursues multiple purposes and social values, among which the most fundamental and renowned one is establishing a living environment with a high level of social cohesion, strong social ties, a high level of social participation and a sense of community (Riedy et al., 2017; Weijs-Perrée et al., 2015; Van den Berg et al., 2021). Contributing factors to this value are various of the previously discussed characteristics; the participatory design process, a design which facilitates the community philosophy and provides opportunities for social encounters, the presence of (extensive) common facilities and complete residential management (Tummers, 2015; McCamant & Durrett, 2011; Marckmann, 2009; Jarvis, 2015; Williams, 2005b; Brenton, 2013).

A second value and purpose of co-housing – which can be considered as an extension of a higher level of social cohesion, and which is especially of importance for co-housing projects which offer housing for elderly – is counteracting loneliness. The study of Hopwood and Mann (2018) states that social liv-

ing environments with a sense of community, help in preventing loneliness and social isolation, especially among elderly. In addition, the research of Bamford (2005) concludes that one of the primary motivations for senior for choosing co-housing, is to maintain social contacts and prevent loneliness. Subsequently, Sandstedt and Westin (2015), Cacioppo and Patrick (2008) and Kat (2019) report comparable outcomes on the role of co-housing in counteracting loneliness.

A second resultant of a high level of social cohesion, strong social ties and a sense of community, is an above average level of neighbor support and mutual help among co-housing residents. In the research of Van den Berg et al. (2021) it is mentioned that social cohesion is an important factor in the access to neighbor support and mutual help. Frankenmolen (2014) underlines this principle in a study regarding the relation between neighbor support and social networks within co-housing environments, since the results prove that the perceived social cohesion level has a positive influence on the access to neighbor support and mutual help. Moreover, in a literature study on senior co-housing, Riedy et al. (2017) also conclude that the level of mutual help is significantly higher in co-housing projects, and substantially reduces seniors' dependence on governmental health services. Studies of Brenton (2013), Marcus and Dovey (1991), Meltzer (2005), Meltzer (2000) and Fromm (2000) confirm these findings on mutual help in co-housing projects.

Subsequently, in view of the high level of social cohesion, the positive impact on combating loneliness, and the high degree of mutual help among residents, co-housing is considered as a decent concept for ageing in place among seniors. In an extensive literature study, Labit (2015) states that through mutual help and a high degree of solidarity, people can maintain/extend their independence and self-reliance, wherewith a sustainable and self-sufficient housing community appears. Furthermore, Rodman (2013) concludes that both mutual help, a high level of social cohesion and preventing loneliness contribute to ageing in place, since co-housing environments result in a more active and healthier lifestyle. In a study on elderly co-housing, Glass (2009) also reports that co-housing is a suitable housing environment for elderly to age in place, due to the high level of social cohesion and strong social ties, which result in a greater degree of mutual support between residents. Other relevant researches which found comparable outcomes on the contribution of senior co-housing on ageing in place, were conducted by DCLG (2009) and Scanlon and Arrigoitia (2015). Eventually, it can be concluded that a high level of social cohesion, preventing loneliness, and a high degree of mutual help are all mutually connected/related to ageing in place.

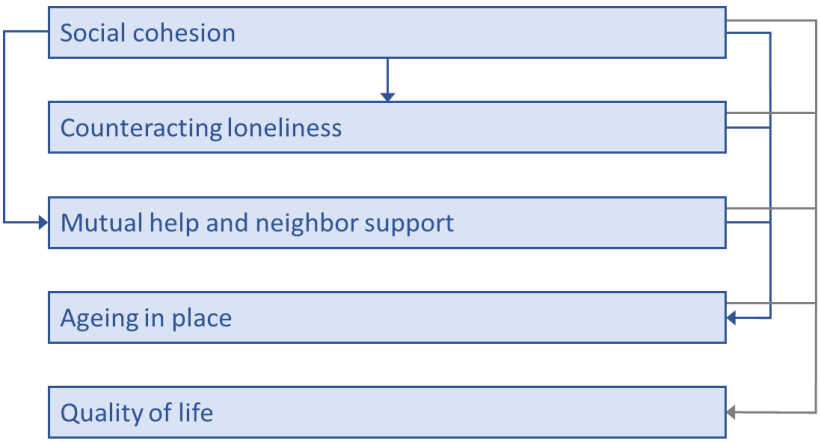

Figure 2.1: Visualization of mutual relations between social aspects of co-housing.

The final to be discussed value of co-housing and its social living environment, is the contribution to a high quality of life, where all four previously discussed aspects are part of. In the research of Rodman (2013), it is stated that the environment which stimulates ageing in place, and the provision of neighbor support encourage elderly's wellbeing and quality of life. Kvietkute and Hauge (2022) explain that a the high level of social cohesion and a sense of community, help in preventing loneliness, which in turn has a positive effect on elderly's quality of life. Also Dempsey et al. (2011) and Steg et al. (2019) prove the positive impact of co-housing on someone's wellbeing / quality of life.

Based on the above findings and conclusions, it can be stated that co-housing has a strong social character, and has a significant positive impact on various social values/aspect, namely a high level of social cohesion (in combination with strong social ties, a high level of social participation and a sense of community), preventing loneliness, a high degree of mutual help, a positive contribution to ageing in place and a positive impulse on someone's quality of life. Moreover, as previously explained, these aspects are mutually related, and contribute to each other interchangeable. These mutual relations are visualized in figure 2.1.

2.1.3. The definition of co-housing

As previously mentioned, a container term for housing concepts with common facilities and which anticipate to a high level of social cohesion and interaction, is co-housing. Within these housing concepts, residents share – to some extent – common facilities, and help, share and interact with each other. This makes co-housing fundamentally different than 'traditional' housing environments. Looking at the past, the Dutch national association *Centraal Wonen* defined the term *centraal wonen*, a precursor of co-housing, already in 1978. Their definition of centraal wonen read "a way of living where residents – at least three adults – choose each other on the basis of equal rights and share a number of residential facilities" (Krabbe & Vlug, 1986). Subsequently, it seems that the actual term 'co-housing' officially first was used by two American architects, McCamant and Durrett, in 1988 who wrote a book about how co-housing could contribute to – for that time – housing challenges (McCamant & Durrett, 1988). Since then, co-housing is a frequently discussed topic within literature. Concerning the definition, there appears to be no unambiguous agreement on the exact definition of 'co-housing'.

Tummers (2017) defines co-housing as follows: "co-housing is a type of collaborative housing in which residents actively participate in the design and operation of their own neighborhoods. Co-housing residents are consciously committed to living as a community. The physical design encourages both social contact and individual space."

A different definition is used by Franck and Ahrentzen (1989) in their anthology *New Households, New Housing.* They specify co-housing as "housing that features spaces and facilities for joint use by all residents who also maintain their own individual household."

In addition, in a study conducted by Bamford (2005) concerning co-housing for elderly in Denmark and the Netherlands, co-housing is referred to as: "living together on one's own, where residents share common spaces and undertake activities together, without having to sacrifice their own dwelling and privacy."

Subsequently, Bakker (2009) makes a distinction between an 'intentional community' and 'co-housing', whereby co-housing is a derivative of an intentional community. The working definition of co-housing which is applied by Bakker (2009) is as follows: "Co-housing is a special form of intentional community

where each household has its own facilities and where the community shares one or more rooms, meeting places, gardens, etc."

Riedy et al. (2017) conducted a research on the opportunities co-housing provides for seniors in Australia. They define cohousing as "a form of community living that contains a mix of private and communal spaces, combining autonomy and privacy with the advantages of community living."

Subsequently, the Cohousing Association of the United States – which concerns the national co-housing community of the United States and who commits for raising interest and awareness of the benefits of co-housing nationwide – specify co-housing as "an intentional, collaborative neighborhood that combines private homes with shared indoor and outdoor spaces designed to support an active and interdependent community life" (Cohousing Association of the United States, 2019).

A comparable Dutch institution concerns Vereniging Gemeenschappelijk Wonen, where over 70 Dutch co-housing communities are part of. They define co-housing as "a form of an intentional community where people consciously choose to live together and where households have a separate dwelling or housing unit available, and common areas and facilities are being shared" (VGW, 2023).

Furthermore, there are also various market parties, specialized in co-housing projects, who have defined co-housing. One of these parties is Heem, the Belgian project developer Heem, specialized in the development of co-housing projects. They refer to co-housing as "various private dwellings arranged together, whereby residents have access to additional shared facilities to emphasize community interaction, such as a spacious garden, community center, pool, sauna or outdoor kitchen" (Heem, n.d. -c).

Another Belgian co-housing initiator concerns Cohousing Projects, who both commercially develop co-housing projects and manage CPC co-housing initiatives. They define co-housing as follows: "a housing environment where residents have – besides their fully equipped private dwelling – access to a shared garden and community center, with various common facilities. Within these projects the residents have a leading role as they devise, design and maintain their shared living environment" (Cohousing Projects, n.d. -b).

Finally, Co-housing Arnhem defines co-housing as: "a housing concept which combines private houses and apartments, with shared facilities and recreational amenities. The community gets designed, maintained and managed by the residents, who choose for a social life and sharing facilities, belongings and moments" (Cohousing Arnhem, 2021a).

The common thread of these definitions, is that co-housing can be defined as a housing concept with private dwellings, accompanied by common facilities for joint use. What is striking, is that some definitions include the initiative, participation and involvement of residents during the concept and design phase wherewith these articles create a link between co-housing and CPC projects (Tummers, 2017; Co-housing Projects, n.d. -b; Cohousing Arnhem, 2021a, Glass, 2009; De Vos & Spoormans, 2022).

On the other hand, the majority of the earlier cited definitions do not comment on the form of commissioning. In contrast, various other articles even state that co-housing projects can be initiated and developed by a group of private individuals as well as a commercial party. In a comparative analysis on senior co-housing concepts, Pirinen (2016) concludes that co-housing projects can also be developed by a commercial project developer. This principle is also underlined by Hessellund (2020), Felix (2019) and Beck (2020). All in all, these findings and perspectives will be taken into account in formulating the definition of 'co-housing' in conclusion of this chapter.

2.2. COMMON FACILITIES WITHIN CO-HOUSING PROJECTS

Besides a private dwelling, residents within a co-housing project dispose of one or multiple common facilities. These facilities are considered as the cornerstone of co-housing, as they are the place where residents can meet and interact with each other, and in turn, contribute to a high level of social cohesion and social participation (Van den Berg et al., 2021; Beck, 2020; Kvietkute & Hauge, 2022; Meltzer, 2005; Williams, 2005b). This sub-chapter gives an explanation on the definition and role of common facilities within co-housing projects. Subsequently, a discussion on prevalent common facilities in various analyzed reference projects follows in response to sub-question 1.

2.2.1. Definition of common facilities

Concerning the definition of 'common facilities' within the context of co-housing, this term is significantly less frequent defined in literature, compared to 'co-housing'. In the research conducted by Riedy et al. (2017), common facilities are referred to as "shared spaces to maximize opportunities for community interaction, while not forcing interaction." A common living room, laundry room, shared kitchen and outdoor spaces are mentioned as examples of such facilities.

Subsequently, De Vos and Spoormans (2022) conducted a comparative analysis on co-housing projects in Belgium and the Netherlands, on the historical and political context, laws and legislations, the role of the architect and differences in co-housing characteristics between the two countries. Within their article, common facilities are referred to as "central units with shared facilities, such as a kitchen and/or meeting room, which encourage social interaction among residents."

Furthermore, in a publication of Tjeerd (2023) on the future of co-housing, common facilities are specified as "a shared space where residents can relax, socialize and spend time with each other – such as communal living rooms, dining rooms, kitchens and outdoor spaces."

In the article of Boelens and Visser (2011) on self-construction projects, common facilities are identified as "a common house for daily use, that typically includes a large kitchen, dining and recreation area, children's playroom and laundry, and also may contain a workshop, library, exercise room and shared guest rooms."

Cohousing Association of the United States (2019) also defined common facilities, within the context of co-housing. According to their co-housing glossary, common facilities are "facilities designed, managed and shared by a co-housing community (supplemental to private residences)."

In addition, UK Cohousing (2021) refers to common facilities as "a common house, providing a balance between privacy and community, with shared facilities such as cooking and dining spaces, meeting and playing areas, laundries and guest rooms."

All in all, the definition that is used for 'common facilities' within this thesis, reads as follows: "spaces and facilities which are shared, used and maintained by the residents of the co-housing projects, as a complement to their private dwelling."

2.2.2. The importance and role of common facilities

Within various scientific studies, many examples of common facilities are mentioned – although it is not known which occur most in practice. The literature study of Bamford (2005) on co-housing for older people in Denmark and the Netherlands mentions a shared kitchen, dining room and laundry room as

examples of common facilities. Subsequently, Scanlon and Arrigoitia (2015) researched the supply and risks of the development of senior co-housing projects, whereby a shared kitchen, dining area and living room are identified as more 'regular' common facilities, and depending on the groups' interest, other functions can be present such as an artist's studio. On the other hand, smaller co-housing communities have often less common facilities, whereby a shared outdoor area, laundry room and some minor living spaces frequently occur, according to McGee et al. (2017).

As discussed in paragraph 2.1.2, co-housing contributes significantly to various social values; social cohesion, preventing loneliness, mutual help / neighbor support, ageing in place and quality of life / well-being. A physical element of co-housing projects which significantly contributes – directly and indirectly – to these specific social values, are the common facilities, wherewith they fulfill an essential role within co-housing projects.

Concerning scientific literature, one of the contributing factors to social cohesion, social participation and a sense of community, are the present common facilities within co-housing, wherewith these fulfill a direct and primary role. Van den Berg et al. (2021) states that these facilities provide opportunities for social encounters and social activities with/between neighbors, which enhance social ties. Furthermore, Williams (2008) underlines too that common facilities contribute to strong social networks and a high degree of social cohesion between residents. In line, Boelens and Visser (2011) report higher social cohesion levels in housing projects where common facilities are present, and which are managed and maintained by the community. On the other hand, Van der Wiele (2017) concludes conflicting results in her study with respect to influential factors on neighborhood social cohesion within CPC housing projects. A negative effect is found on the presence of common facilities and neighborhood cohesion, whereby noted that this correlation remained unclear.

Subsequently, important (design) principles with respect to common facilities for strengthening their social role, are that they should be of good quality, have sufficient usable space, are centrally located and are of high visibility. These design principles will maximize the usage of the common facilities, and therefore maximize the potential on social encounters (Williams, 2005b; Torres-Antonini, 2001).

Furthermore, a second primary role of common facilities with respect to the social values of co-housing in general, is counteracting loneliness. Common facilities help in preventing loneliness, as they contribute to a higher level of social cohesion and offer a designated physical place where residents can meet each other and organize activities together (Schröder & Scheller, 2017; Rusinovic et al., 2019). To conclude, common facilities contribute to social cohesion and preventing loneliness, and as discussed in paragraph 2.1.2, these values of co-housing are interrelated with other social values, on which it can be stated that communal facilities also contribute – indirectly – to mutual help, ageing in place and quality of life. All in all, common facilities form the (physical) social heart within co-housing projects, and serve as an essential social supporting factor.

2.2.3. Prevalent common facilities

To gain insight into prevalent common facilities among elderly co-housing projects, existing co-housing projects have been analyzed in four countries; Denmark, the Netherlands, Belgium and Germany. The substantiation for choosing these four countries, is that in this manner the widest possible palette of common facilities can be identified, since these countries pay above average attention to co-housing projects and initiatives and are considered as European frontrunners within this emerging movement.

In an evaluating research on co-housing planning in northern European countries, Choi (2007) concludes that co-housing is a rather scarce housing option, but is more common in Denmark, Sweden and the Netherlands. This also holds for Germany (Ache & Fedrowitz, 2012; Szypulski, 2016) and Belgium (Njiokiktjien, 2021). Furthermore, Hagbert et al. (2020) also mention Denmark, Sweden and Germany as leading European countries within the context of co-housing. Finally, also Devloo (2013) refers to Germany, the Netherlands and Denmark as frontrunning countries.

Subsequently, to identify the widest possible palette of common facilities, for each country eight reference projects have been studied, which comes down to 32 examined projects. The co-housing projects were selected based on three criteria: country (Denmark, Netherlands, Belgium and Germany), target group (co-housing project exclusively for elderly, or multigeneration project with dedicated dwellings for elderly) and availability of project information (e.g. present common facilities, number of dwellings, living areas). In appendix A, a description and visualization of each analyzed co-housing project can be found. Subsequently, seventeen different common facilities have been found in the analyzed reference projects (see table 2), whereby these seventeen 'types' of common facilities have been included in the comprehensive overview as shown in appendix B. In this overview, per project is indicated whether a common facility is present or not, after which a total score of presence is calculated.

Table 2: Overview of included and examined common facilities of reference projects.

Indoor	Outdoor	Other
• Living room • Kitchen + dining room • Library / office room • Hobby room / atelier • Laundry room • Exercise room / gym • Wellness (e.g. sauna) • Personal care facilities • Guest room	• Terrace / garden • Agriculture / greenhouse • Outdoor kitchen • Outdoor game court (e.g. Jeu de Boules court) • Swimming pool / pond	• Shared bike / scoot mobile parking • Housekeeper • Shared mobility

Concerning the most prevalent common facilities within the 32 analyzed projects, the common terrace/ garden is the most prevalent shared facility, as it is present within all 32 reference projects. Subsequently, the shared living room comes in second place with 25 cases, closely tracked by the kitchen and dining room with 24 cases. Hereafter, the common bike parking, hobby room / atelier and agricultural facilities follow, with 20 to 22 cases. The guest room, library / office room and laundry room represent the middlemost with 16, 13 and 11 cases. Next, shared mobility, an outdoor game court, an exercise room and wellness facilities are considerably less common, as these occur merely in 8 to 4 reference projects. In the end, an outdoor kitchen, outdoor swimming pool/pond, personal care facilities and a housekeeper follow, which are rather uncommon with only 1 to 2 cases. In figure 2.2, the total distribution of common facilities is visualized, sorted from most to least present.

Regarding the number of common facilities per project, the majority of the reference projects contain four to eight different communal facilities (85% of the analyzed projects) with outliers of two to ten shared facilities per project (15% of the analyzed projects). On average, the Danish, Belgian and German co-housing reference projects hold seven shared facilities per project, whereas this mean is somewhat lower compared to the Dutch reference projects; six facilities per project.

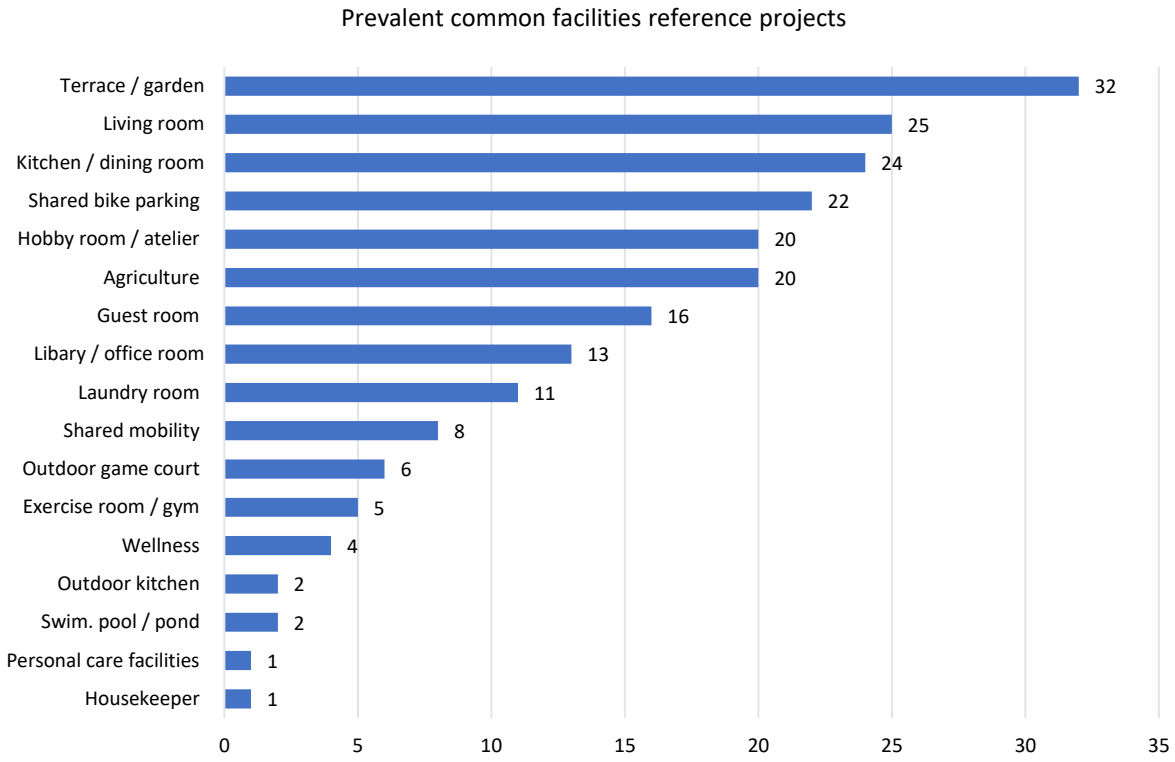

Figure 2.2: Prevalent common facilities among analyzed reference projects.

Subsequently, a clear correlation between the number of dwellings and the number of common facilities per project does not seem to exist, since there are several smaller projects with extensive common facilities, whereas other bigger projects exist with comparatively few common facilities. Finally, regarding the surface/area of common facilities per project, and discounted per dwelling, it can be stated that these areas vary significantly; from 37 to 1,500 m2 per project, and from 1.4 to 20 m2 per dwelling. Though, caution is warranted regarding the significance of these numbers, since relevant data was only available for one-third of the analyzed projects.

2.3. INFLUENCING CHARACTERISTICS ON PREFERENCES

Within this sub-chapter, literature will be discussed with respect to personal influencing characteristics on people's preferences, related to co-housing. This with the purpose to explore which variables to include within the research and survey, in order to analyze the influence of personal characteristics on preferences for common facilities within elderly co-housing projects. The following paragraph will elaborate on personal influential characteristics related to co-housing. Subsequently, the two paragraphs which follow hereafter will comment on personal influential characteristics related to social cohesion and the shared economy, as these are closely intertwined with the vision and philosophy of co-housing.

2.3.1. Influencing characteristics related to co-housing

In the scientific field, the topic of housing preferences tends to be widely discussed and heavily researched, from various theoretical perspectives (Gurran & Bramley, 2017). Although, Clapham et al. (2012) state that knowledge regarding underlying motivations for housing preferences is still fragmented. For the field of co-housing, research on the motivations and driving forces are even more scarce, according to Lang et al. (2018). In response, Kvietkute and Hauge (2022) conducted a qualitative study on people's

motivations and stated preferences for considering co-housing in Norway, in which various influencing personal characteristics are discussed.

At first, age is found to be an important personal characteristic, regarding preferences for co-housing. Kvietkute and Hauge (2022) report a difference in motivational aspects between age groups for considering co-housing. For younger age groups motivations were merely related to environmental aspects, whereas older people indicated social and pragmatic motives, such as a higher degree of social contacts and preventing social isolation. Butot (2017) reports age as influential characteristic too on individual's motivations for co-housing and states that elderly see co-housing merely as suitable housing concept in the context of ageing in place and counteracting the risk on loneliness.

In addition, gender is identified as influential personal characteristic too, since it is found that females are somewhat more interested in co-housing, compared to men (Kvietkute & Hauge, 2022). In a study of Vestbro (2010), it is concluded that, on average, women make up the majority of residents within a co-housing project. A possible explanation may be that women benefit most of certain housing environments, due to shared responsibilities regarding household activities and taking care of the children, according to Vestbro and Horelli (2012). Moreover, in practice, several co-housing projects exclusively catered to women are present, while these examples for men lack (Chaudhuri, 2023).

Subsequently, people's household composition/situation is addressed as affecting characteristic. The life stage and situation of 'empty nesters' (people/elderly whereby the children have left the house) and younger, childless people tend to be most suitable for co-housing, according to the study of Kvietkute and Hauge (2012). Households with children living in the suburbs, specifically indicated that this housing concept is 'too premature' for their life stage and that they would be more open towards co-housing when the children have moved out.

Additionally, Kvietkute and Hauge (2022) also asked respondents about their profession field and their attitude towards co-housing with the aim to study if these factors are mutually related. Roughly two-thirds of the respondents indicated to have a (somewhat) positive attitude concerning co-housing. On the other hand, 20% of the respondents stated they felt unsure, 11% was uninterested and 6% had a negative association. Regarding their profession field, it is found that individuals with a profession related to sustainable living, urban planning, the recycling field, sustainable product design and sustainable energy, are above-average interested, because of knowledge and interest in sustainable practices.

The research of Felix (2019) on residential preferences of elderly on co-housing, also investigated individual's willingness to pay for a number of co-housing attributes, among which common facilities. Of all attributes – including the level of mutual help, level of social cohesion and residential form – the highest willingness to pay is found for the presence of common facilities. The paper of Kozeny (2005) with respect to the affordability of co-housing mentions the costs of common facilities as essential and influential component too. Herewith, the price/costs of common facilities is considered as (possible) influencing factor too on individual's preferences.

2.3.2. Influencing characteristics related to social cohesion

Since the available literature and information on (personal) influencing characteristics related to co-housing is relatively limited, influential factors on social cohesion are considered too. This with the vision that co-housing concerns a social living environment, aiming at and contributing to higher levels of (perceived) social cohesion between residents.

In line with personal influencing characteristics on co-housing, age is also reported as influencing characteristic on social cohesion (Ellaway et al., 2001; Oh, 2003). Research concludes that older individuals are more likely to socially interact with their local ties (Van den Berg et al., 2015) and that elderly are more likely to have neighbors in their social network (Völker & Flap, 2007). In addition, Shaw (2005) reports a positive relation between people's age and perceived level of neighborhood cohesion and mutual help. Also the study of Van den Berg et al. (2021) on influencing factors on neighbor support and social cohesion in collective housing projects, concludes that age is positively related to social cohesion. Concerning the level of social interactions between residents within a traditional apartment building, Nguyen et al. (2020) finds the contradiction that people aged above 55 years, experience the lowest number of social interactions, compared to younger age groups.

Besides age, the research of Van den Berg et al. (2015) adds gender as influencing characteristic too, as it is found that females are more likely to socially interact with their neighbors, and experience a higher degree of neighbor support, according to Shaw (2005).

Concerning individual's household size, people with a larger household size are more likely to socially interact with their neighbors (Van den Berg et al., 2015). Moreover, Völker and Flap (2007) include that people with a larger household size are more likely to have people living near in their social network. Besides household size, household composition may also be of influence. Research states that people having children are more likely to socially interact with their neighbors and experience greater levels of social cohesion (Völker & Flap, 2007; French et al., 2014; Frieling, 2008; Nguyen et al., 2020). As explained by Frieling (2008), as children often play with other children from the neighborhood, they form a 'stimulating factor' in increasing contact between neighbors/parents, for example when bringing and picking up the kids. Subsequently, part of household composition is if people have a partner or not. Oh (2003), Oh and Kim (2009) and La Grange (2011) state that people with a partner in general experience greater levels of social cohesion. Also Shaw (2005) reports a positive association between having a partner and social cohesion and neighbor support. Furthermore, the study of Van der Wielen (2017) on perceived neighborhood social cohesion in CPC projects underlines these findings, as a direct positive effect was found between having a partner and perceived neighborhood cohesion.

Based on the studies of French et al. (2014) and Pampalon et al. (2017), education level is also a major factor to be concerned. Both report a negative relation between an individual's education level and the amount of perceived social cohesion. Similarly, Van Den Berg and Timmermans (2015) conclude in their multi-level path analysis on social networks and social interaction in the neighbourhood, that individuals with a lower education level more often socially interact with their neighbors. On the other hand, Völker and Flap (2007) conclude that higher educated people have more often neighbors in their social network.

In extension, a characteristic strongly related to someone's education level is income. In general, people with a higher education level earn higher incomes, according to Wolla and Sullivan (2017), who conducted a study on the relation between people's education, income and wealth. In the study of Völker and Flap (2007) on the role of neighbors in the social network of adults, it is found that people with a higher income are more likely to have neighbors as part of their social network. Furthermore, people with a higher income have often more intense social contact with their neighbors, perceive greater neighborhood cohesion and are more attached to their neighborhood (Dekker & Bolt, 2005; Abdullah et al., 2014), which seems in contrast to the statements regarding the relation between education level and social cohesion (French et al., 2014; Pampalon et al., 2017).

Besides education level and income, people's employment status is also considered as important characteristic, related to social cohesion. In the research of Van den Berg et al. (2015) it is found that people who do not work are more likely to spend more time at home and therefore have greater social interactions with their neighbors. On the other hand, individuals who work full time are less likely to socially interact with people living near. Subsequently, Ellaway et al. (2001) and French et al. (2014) report that retired people perceive greater levels of social cohesion with their neighbors.

Various studies also indicate individual's current housing situation as influencing factor on perceived social cohesion. Stone and Hulse (2007) report that people who live in a semi-detached or detached house perceive a higher level of social cohesion and feel more part of the local community, compared to other housing types such as apartments. On the other hand, Van den Berg et al. (2016) state that older adults living in a multi-family dwelling are more likely to have surrounding residents as part of their social network. Concerning homeownership, research reports that people who live in an owner-occupied dwelling experience higher degrees of social cohesion with neighbors (Oh, 2003; Oh & Kim, 2009) and have greater access to social support (Shaw, 2005). Likewise, Völker et al. (2007) substantiate this by the fact that people who live in an owner-occupied dwelling feel a stronger incentive to invest in neighborhood contacts.

2.3.3. Influencing characteristics related to the shared economy

The sharing economy, built upon the philosophy of sharing goods and resources among users mutually, is getting increasing attention in the scientific research field (Belk, 2007; Martin, 2016). This distinctive and innovating movement allows people to rent the goods they need on a short or (medium) long term basis, whereby users and providers are often connected by software platforms. In general, the opportunity to achieve time- and cost-effectiveness makes the sharing economy attractive for its users, and also the sustainable character draws attention (Bellotti et al., 2015). Making the translation to co-housing, this follows to a certain extent the philosophy of a 'sharing economy', given that there is a strong emphasis on sharing instead of privately owning (Harvard University, 2019). Considering these common grounds, studies on influencing factors within the field of the sharing economy also have been included in this discussion.

In the study of Baro et al. (2022), the role of personal factors on the intention of people to participate in the sharing economy is investigated. The study focusses on the intentions of people to act as user, as well as provider within the sharing economy, with the aim to steer on a more comprehensive understanding of individual's intentions and motivations. The research of Baro et al. (2022) includes personality traits, personal values and intentions, as well as personal / socio-demographic characteristics.

First, Baro et al. (2022) find gender to be an influential characteristic, whereby women are less willing to participate in the sharing economy, compared to men. On the other hand, the study of Hellwig et al. (2015) on sharing behavior states that women are significantly more willing to share and show considerable more and frequent sharing behavior than men, which might be explained by their stronger prosocial attitude, and greater attention for and interest in sustainability (Schwartz & Rubel-Lifschitz, 2009; Smith, 2016). Furthermore, Baro et al. (2022) reports that a possible explanation for their result may be linked to the fact that women are more aware of their personal safety than men, when interacting with strangers – which is inevitable when making use of sharing economy services.

Another essential determinant is age. Younger generations are digital natives and have grown up with technologies and services, aimed at a sharing economy, such as Uber and Airbnb (Baro et al., 2022). Konrad and Wittowsky (2018) conducted a study on mobility and travel behavior of younger generations and report an above average positive attitude towards shared mobility and transport, instead of owning a private car. In addition, Ranzini et al. (2017) state that millennials are the moving force behind the development of the shared economy since their consumption attitudes are more complex, compared to older generations. However, Baro et al. (2022) conclude in their study that 'older' individuals have a more positive attitude towards the sharing economy, compared to younger generations. However, caution is needed when extrapolating this statement towards 'senior' generations, since Baro et al. (2022) aim their research towards a relatively young population group with a mean age of approximately thirty years old.

Further, Baro et al. (2022) includes education level as influencing characteristic in their research. With respect to the relation between education level and sharing economy demand a significant relation is assessed, while on the other hand no significant relation is reported between education level and sharing economy supply. As Baro et al. (2022) hypothesizes, higher educated individuals are more likely to participate in the sharing economy. Furthermore, they report that the relation between sharing economy demand and education level intensifies, the more conscientious someone is. Brieger et al. (2018) explain that the shared economy is associated with sustainable consumption and that higher educated individuals often show more socially oriented and sustainable behavior. In addition, Cansoy and Schor (2016) and Smith (2016) conclude that higher educated people are more likely to use shared mobility or shared housing/accommodation platforms.

Next, Baro et al. (2022) also state income as personal influencing characteristic. In literature, monetary and economic incentives are the most researched motives for participating in the shared economy whereby studies prove that financial benefits are one of the most crucial stimuli in engaging in the shared economy (Moeller & Wittkowski, 2010; Eckhardt & Bardhi, 2015). The study of Baro et al. (2022) concludes that income is positively related to the sharing economy, which implies that individuals with a higher income are more likely to participate in the shared economy. On the other hand, Böcker and Meelen (2017) and Ranzini et al. (2017) find the contradiction that lower levels result in a higher participation degree within the shared economy.

Furthermore, in line with influencing factors related to co-housing, costs are also addressed as influencing factor in the field of the shared economy – as part of willingness to pay. Research reports that besides ideologic reasons and experience seeking, financial benefits (cost savings) are a major motivation for people to choose to participate in the shared economy. Hereby, the level of participation strongly depends on personal characteristics such as gender, income and education level, but also on the associated costs of the shared service (Lutz & Newlands, 2018; Xu, 2019).

Finally, in line with the study of Kvietkute and Hauge (2022) mentioned in paragraph 2.3.1, the study of Baro et al. (2022) also asked respondents about their attitude towards the sharing economy, as this plays a vital role in the decision whether to participate or not. The empirical results shows a positive and significant relation between a positive attitude and the shared economy demand of people, but not on the supply side.

2.4. CONCLUSION

Within this chapter, important existing knowledge has been discussed, essential for framing the context of this research, as well for designing and setting up the actual research. In sub-chapter 2.1, the characteristics of co-housing have been discussed. It was found that within literature various 'sets' of co-housing characteristics occur. Although, within this thesis the well-known and often referred to set of McCamant and Durrett (2011) is applied, resulting in the following six co-housing characteristics: a participatory (design) process, a design that facilitates the community, the presence of extensive common facilities, complete residential management, a non-hierarchical structure and separate income sources. Regarding the vision and (social) values of co-housing, co-housing targets on establishing a housing/ living environment with a high level of social cohesion and a sense of community. Other – interrelated – values concern preventing loneliness, neighbor support and mutual help, stimulating ageing in place, and contributing to a high quality of life.

With respect to the definition of co-housing, there appears to be no unambiguous definition. Derived from various definitions in literature the following definition for co-housing is applied within this thesis: "a collective housing form – privately or commercially initiated and developed – whereby each household has their own private dwelling, accompanied by one or multiple common facilities which are shared within the community, with the purpose to create and facilitate a social and communal living environment." In turn, common facilities are defined as "spaces and facilities which are shared, used and maintained by the residents of the co-housing projects, as a complement to their private dwelling."

Concerning te role of common facilities, it can be concluded that they deliver an essential contribution to the social values of co-housing, since they concern the physical and designated place where co-housing residents can meet and interact with each other, and organize social activities together.

In response to sub-question 1 – "What are prevalent common facilities among existing elderly co-housing projects?" – 32 co-housing projects have been analyzed on their prevalent common facilities. It can be concluded that the shared garden/terrace is the most prevalent common facility, followed by a common living room, kitchen / dining room, shared bike parking, hobby room / atelier and the agricultural facility. Subsequently, the guest room, library / office room and laundry room followed. Other common facilities were significantly less present.

Subsequently, since the available literature related to influencing personal characteristics related to co-housing was relatively limited, personal influencing factors regarding social cohesion and the shared economy have been reviewed too since these fields follow a comparable philosophy. In conclusion, the following possible personal characteristics have been derived, distributed over four categories:

- Personal factors: Age, gender, education level, employment status, profession field;
- Household characteristics: household composition, household size, household income;
- Current housing situation: dwelling type, home-ownership;
- Costs: Costs of common facilities.

3. RESEARCH APPROACH

In this chapter, the research plan will be discussed. The purpose of this chapter is to explain how the results and findings of chapter 2 are implemented in the research and questionnaire, and to clarity how the results of the experiment will be analyzed. Within chapter, first the conceptual model will be discussed, after which the methodology is covered. Subsequently, the to be included common facilities within the questionnaire are addressed, even as their costs, after which the questionnaire design will be reviewed. Hereafter, the sample and data acquisition are clarified, followed by a chapter conclusion.

3.1. CONCEPTUAL MODEL

One of the goals of the literature review in chapter 2, was to identify the variables that could potentially influence the preferences regarding co-housing and its associated common facilities. Out of this analysis, various variables emerged, distributed over four categories: personal factors, household characteristics, current housing situation and the costs of common facilities. Another purpose was to gain insight into the diverse common facilities that exist. Based on this information, the conceptual model in figure 3.1 was constructed, which serves as input for the questionnaire design.

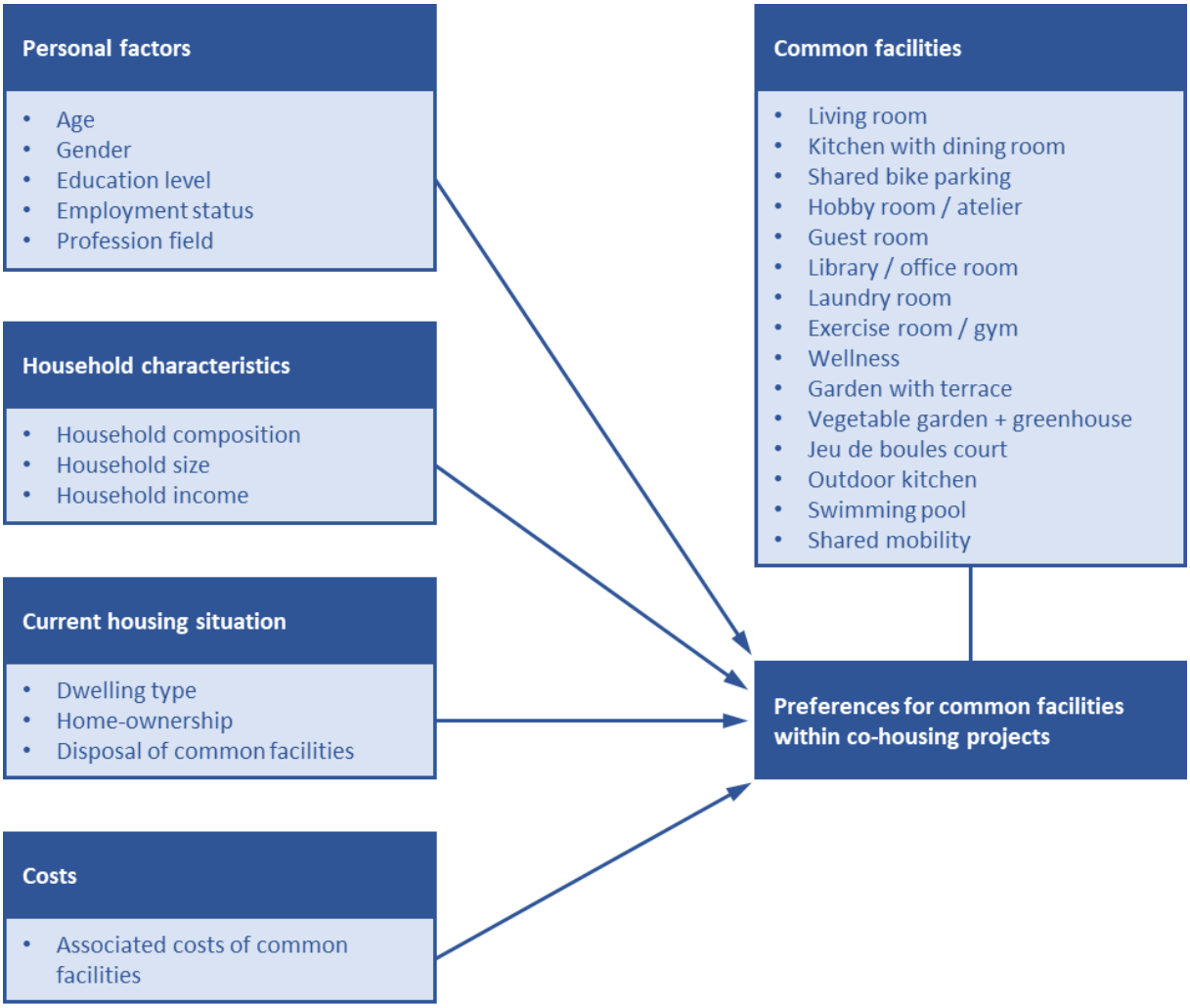

Figure 3.1: Conceptual model.

3.2. METHODOLOGY

In this section, the methodology is addressed. The first paragraph provides an explanation on the possible applicable research methods for studying preferences, followed by a discussion on the chosen research method. Hereafter, the analysis method for analyzing the data is explained in the second paragraph (paragraph 3.2.2).

3.2.1. Measuring preferences

The elected approach for this research, is a quantitative study with a correlational, descriptive and explanatory character. This approach is considered as most suitable, since the purpose of this study is to gain insight in the most preferred common facilities among elderly within a co-housing project, to determine if the presentation of costs of those facilities influences these preferences, and to analyze if personal characteristics correlate with these preferences.

Researching individual's preferences can be done through various methods. A 'revealed preference' experiment, a 'stated preference' experiment, an evaluation by ranking or valuation by numerical score, are commonly used quantitative research methods (Hensher et al., 2005). The revealed preference and stated preference research methods, are based on the theory that consumer preferences are analyzed through measuring the utility of certain choice alternatives (Ali, 2020). Herewith, these techniques can be used to find and understand preferences between sets of attributes; also called profiles. Though, the difference between these two methods is that a revealed preference experiment is based on revealed/observed decisions in practice (actual consumer choices), while a stated preference experiment is based on not existing choice alternatives (hypothetical consumer choices) (Hensher et al., 2005). Comparing these experiments, Lambooij et al. (2015) conducted a study on the consistency between stated and revealed preferences and conclude that in 26% of the cases respondents stated preferences do not match their revealed preferences, due to more socially desirable decisions versus 'real' preferences. Herewith, they mention that revealed preferences may provide more accurate outcomes compared to a stated preference experiment. On the other hand, Ali (2020) highlights the possibility to measure individual's preferences for new, not existing alternatives as a significant advantage of a stated preference experiment. This statement is in line with the explanation of Kemperman (2022) on the advantages of a stated choice experiment, which is considered as research method within the field of stated preferences. In addition, the possibility for multiple observations per respondent and a low or even no correlation between the attributes of a choice alternative, are reported as strong advantages.

Another applicable research method for investigating individual's preferences, is an evaluation by ranking; also called 'ranking models'. This research method can be used in studies related to the preferences of individuals on a separate item, within a set of items (Restle, 1961; Bock & Jones, 1968). Moreover, according to Lam et al. (2010), an evaluation by ranking – such as a best-worst ranking – is an effective and suitable way to collect preference data, and is comprehensible for the respondents, which in turn results in a higher response rate. On the other hand, Hensher et al. (2005) state that "an evaluation by ranking implies relativity, whereby precision by a cardinal measurement is not possible (also known as ordinal measurement)". An example of a study in which this research method has been applied, is the research conducted by Van der Waerden and Van der Waerden (2023) on bicyclists' annoyances while cycling on separate bicycle paths, in which respondents were asked to rank nine different circumstances from most annoying to least annoying.

Subsequently, Hensher et al. (2005) also mention scaling techniques as potential research method for researching preferences, among which a rating scale is a commonly used technique (Taherdoost, 2019). Rating scale surveys make use of closed questions, whereby respondents are asked to rate a certain (choice) alternative within a defined bandwidth. For example, respondents may be asked to express their preference, agreement or satisfaction for a certain alternative, on a scale of 1 to 5 or 1 to 10; from not at all satisfied to very satisfied (Webster, 2021). An advantage of rating scale questions is that they are easy to understand for respondents, provide a limited number of answer options, give approximate answers without going too much in detail and provide data suitable to examine trends (Webster, 2021; Rezende & Medeiros, 2022). However, in literature there is a debate on these rating scales. The reliability and validity is confirmed, but there is discussion on which scale is most suitable, and about the influence of the number of scale options on the reliability and tendencies of the responses (Cabooter et al., 2016; Dawes, 2008; Nadler et al., 2015). In addition, Kunz (2015) adds the deficiency that respondents are often seduced to rely on cognitive shortcuts, which result merely in satisfying rather than optimal reliable answers.

Considering the various discussed research methods applicable for measuring preferences, within this research an evaluation by ranking will be applied. The rationale for this choice is based on the phenomenon that, to date, no research has been conducted with respect to elderly's preferences for common facilities within co-housing projects, and so no information on preferences for common facilities is available. Through the application of an evaluation by ranking, first, preferences for separate common facilities are captured, which is valuable since there is not any insight into these preferences yet. Moreover, an evaluation by ranking concerns a simple, manageable and accessible method for respondents, which should contribute to a relatively high response rate. On the other hand, in case of a (stated or revealed) preference experiment, for this method it is more obvious to present a set of common facilities, wherewith this method is considered as an extension to this study; the next step in researching preferences for a set of common facilities within a co-housing project.

Within the research and survey, the evaluation by ranking will consist of two parts. During the first part respondents will be presented with fifteen common facilities, and asked to rank their top six from most to least preferred. Subsequently, in the second part the same common facilities will be presented, but this time with their associated costs. Also here respondents will be asked to rank their top six common facilities from most to least preferred, but this time also taking into account the associated prices. Further information with respect to the common facilities, rating scale items and questionnaire setup follows in sub-chapter 3.3 and 3.4.

3.2.2. Analysis method

Insight into individual preferences among (ranking) alternatives will be obtained through the previously described ranking experiments, with the preferences represented as utilities that indicate the strength of these preferences. Van Dijk and Fok (2007) describe that in a traditional setup for studying preferences, respondents are often asked to selected their most preferred alternative out of a set of alternatives. However, they add that more information can be obtained when respondents are asked to rank the alternatives from most to least preferred. As suggested by Van Dijk and Fok (2007) and the tutorial handbook of Statistical Innovations (2021), a rank-ordered logit (ROL) model is considered as commonly used and most suitable analysis method, when analyzing ranking data.

Rank-ordered logit model

The rank-ordered logit model is developed for analyzing ranking data on individual preferences from a set of alternatives, and was first introduced in literature by Beggs et al. (1981), who conducted a ranking experiment on potential consumer demand for electric cars. Within the context of analyzing ranking data, the ROL model is considered as most efficient since it considers a set of ranking alternatives instead of only taking into account the most preferred alternative from a set. In addition, the ROL model takes into account all observed ranking data, while considering the possibility that rankings may not completely mirror true preferences. Herefore, latent segments can be applied (Van Dijk & Fok, 2007).

The functioning of the rank-ordered logit model involves a 'traditional' analysis by a multinominal logit model for the first choice; the alternative with the highest preference, among all choice alternatives. This concerns one separate and the first choice set, consisting of fifteen alternatives (fifteen common facilities) of which one receives the highest preference. Hereafter, this process repeats itself whereby the alternative ranked first is excluded from the total choice set (leaving thus fourteen alternatives remaining). By this means, the second choice is considered as first choice, within the set of alternatives that excludes the first choice. In total, this process repeats itself six times (with six choice sets, excluding the previously chosen alternative(s)), since respondents are asked to rank their top six most preferred common facilities (Statistical Innovations, 2021; Van Dijk & Fok, 2007).

Concerning preferences of individuals, these can be represented by the random utility framework, developed by Manski (1977). Within this model, *j* denotes the index of a certain alternative, and the random utilities of individual *i* concern a set of latent variables, defined as:

$$U_{ij} = V_{ij} + \varepsilon_{ij} \quad (1)$$

whereby *i* =1, …, *N* indicates the individual and *j* represents the ranking item. Looking at the equation, this consists of two parts: V_{ij} denotes the deterministic utility component, affected by the observed characteristics of individual *i*, and ε_{ij} represents the random utility component (Van Dijk & Fok, 2007).

For the analysis, the response of respondent *i* will be denoted by vector $y_i = (y_{i1}, \dots, y_{ij})'$, where y_{ij} refers to the rank that individual *i* gave to alternative *j*. To illustrate, if y_{ij} = 2, this implies that respondent *i* ranks alternative *j* as the second most preferred option. Although, for notation convenience, the equivalent notation $r_i = (r_{i^1}, \dots, r_{ij})$ will also be utilized, in which r_{ij} indicates the rank number of alternative *j*, given by respondent *i*. Subsequently, the relation between r_i and y_i is as follows (Van Dijk & Fok, 2007):

$$y_{ik} = j \leftrightarrow r_{ij} = k \quad (2)$$

For $j, k = 1, \dots, J$.

Subsequently, according to Van Dijk and Fok (2007), an observed ranking implies a complete arrangement of the underling utilities, whereby an individual will give the highest preference to the alternative with the highest utility and, conversely, the lowest preference to the alternative with the lowest utility, resulting in:

$$U_{ir_{i1}} > U_{ir_{i2}} > \dots > U_{ir_{iJ}} \quad (3)$$

All in all, under the utility assumption in equation (1) and the assumption of extreme value distribution, Van Dijk and Fok (2007) establish the following rank-ordered logit model:

$$P_r[r_i; V] = P_r[U_{ir\,i1} > U_{ir\,i2} > \ldots > U_{ir\,iJ}] \quad (4)$$

$$= \prod_{j=1}^{J-1} \frac{\exp(V_{ir_{ij}})}{\sum_{l=j}^{J} \exp(V_{ir_{il}})}.$$

Besides the rank-ordered logit analysis on the total sample, multiple rank-ordered logit analyses will be conducted for various sub-groups (an explanation on the applicable sub-groups follows in sub-chapter 4.3). Within a sub-group analysis, the sample is divided into two or more sub-groups, based on a particular variable such as gender, geographical location or income. This with the purpose to explore possible differences, or make a comparison between these groups. Through this approach, heterogeneous results can be explored, or specific questions on particular sub-groups can be answered (Higgins & Green, 2011). To illustrate, within the context of this research, the purpose of the sub-group analysis is to explore whether individuals with a particular background or certain characteristics have other preferences for common facilities within a co-housing project. For example, do individuals living in a highly urbanized residential area have different preferences for common facilities in comparison to those who live in a low-urbanized residential area.

Evaluating the model

In order to evaluate whether the estimated model outperforms the null model, the log-likelihood function of the estimated model is compared to that of the null model. In this case, the null model represents the model in which all fifteen common facilities have the equal opportunity to be chosen as most preferred. On the other hand, the estimated model attempts to refine this null model. Subsequently, if the log-likelihood function of the estimated model shows to be statistically improved over the log-likelihood function of the null model (statistically closer to zero), then the estimated model can be considered as being statistically significant overall. The other way around, the null model represents the average utility of each alternative, and represents the present market shares within the data set. When the estimated model does not improve the log-likelihood function compared with the null model, then the additional estimated parameters do not improve the predictive capability of the null model (Hensher et al., 2005).

The evaluation to compare the log-likelihood of the estimated model with the log-likelihood of the null model, is called the log-likelihood ratio test, resulting in a Log-likelihood Ratio Statistic (LRS). Then, the LRS value can be compared with the critical Chi-square value, to determine whether the model significantly predicts better than the null model. The formula of the log-likelihood ratio test reads as follows (Hensher et al., 2005):

$$LRS = -2\ (\text{log-likelihood null model} - \text{log-likelihood estimated model}) \quad (5)$$

Another method to compare the estimated model with the null model is developed through McFadden (1974), which is called the McFadden Pseudo R^2. According to McFadden (1974), a Pseudo R^2 value between 0.2 and 0.4 indicates a 'good fit'. The Pseudo R^2 can be calculated by the following formula:

$$R^2 = 1 - \frac{LL\ Estimated\ model}{LL\ Base\ model} \quad (6)$$

3.3. COMMON FACILITIES

In the preceding sub-chapter, the research- and analysis methodology were outlined. Prior to delving into the questionnaire design, this sub-chapter will first reflect on the to be included common facilities within the research and questionnaire. The first paragraph of this sub-chapter provides a discussion on the to be included common facilities within this research and the questionnaire. Hereafter, the second paragraph addresses the (monthly) costs of these facilities.

3.3.1. Included common facilities

A to be managed risk in setting up and conducting a survey, is the prevention of respondent burden, as this enhances the potential for 'cognitive shortcuts', and in turn, unreliable outcomes. Following, it is essential to maintain a reasonable level of respondent effort for answering the survey questions (Kunz, 2015). Concerning an evaluation by ranking, a key factor to consider is the number of rating scale items (in this case the common facilities in part 2A and 2B of the survey), which may not exceed a certain maximum amount (Andrews, 1984; Dillman et al., 2009). Furthermore, Drolet and Morrison (2001) add that the larger the number of rating scale items is, the higher the risk on respondent fatigue. Alternately, Van Dijk and Fok (2007) assert that more information can be obtained when respondents are asked to rank a set of rating scale items (alternatives) from most to least preferred, as opposed to ask for the most favored option from a predetermined selection of alternatives.

In the extensive paper of Kunz (2015) on rating scales in web surveys, it is concluded too that the number of rating scale items is a decisive factor in the task difficulty as well as respondent burden. In turn, too much rating scale items result in decreasing respondent motivation and less willingness to provide thoughtful and complete responses. By the examination of 277 rating scale implementations, Hinkin (1995) finds that 73% of these rating scale experiments include a maximum of six rating scale items, 18% contain seven to ten items, and 9% incorporate eleven or more items. Although, findings on the maximum and/or ideal number of rating scale items within an evaluation by ranking experiment are relatively scarce, though a maximum amount of ten items is often suggested (Qualtrics, 2021; Toepoel et al., 2009; Toepoel et al., 2008; Kunz, 2015). Furthermore, the paper of Taylor-Powell (1998) on questionnaire designs suggests that there is another variant of an evaluation by ranking experiment possible as well; respondents can also be asked to indicate a 'top three' out of a list of various rating scale items. This method offers the advantage that respondents can still consider all rating scale items, while limiting the task effort by not having to rank all items.

Taking these findings into consideration, respondents will be asked to distill their top six out of a list of fifteen common facilities, derived from the analyzed reference projects. The reason for indicating a top six is that, according to the research of Hinkin (1995), almost three-quarter of the ranking experiments contain a maximum of six rating scale items wherewith this amount is most common. Subsequently, by the application of the list of common facilities – based on the facilities found in the reference projects (see paragraph 2.2.3) – there is no need for common facilities to be preemptively excluded. Though, since common facilities are referred to as rooms and physical facilities, the decision is made to exclude the housekeeper from the survey and research. Moreover, one of the 32 reference projects contained a common room to be booked for massages and such. This facility will be merged with the wellness facility, since these show great similarities. Herewith, fifteen common facilities, as displayed in table 3, will be included in the ranking experiment.

Table 3: Fifteen to be included common facilities within the ranking experiment.

Indoor	• Living room • Kitchen with dining room • Shared bike parking • Hobby room / atelier • Guest room • Library / office room • Laundry room • Exercise room / gym • Wellness
Outdoor	• Garden with terrace • Vegetable garden with greenhouse • Jeu de boules court • Outdoor kitchen • Swimming pool
Other	• Shared mobility

Within the fifteen included common facilities, frequently occurring facilities among the reference projects are included such as the garden with terrace, living room and kitchen with dining room – these facilities were found in 75% to 100% of the reference projects. On the other hand, the experiment also includes common facilities that are considerably less common, such as the outdoor swimming pool, which occurred only in two reference projects. Nevertheless, including such facilities may be of interest since a private swimming pool is an exclusive and costly facility. Although, within the context of co-housing, this facility may obtain a high preference since costs are distributed among the various households, wherewith such a facility is financially (much) more accessible.

3.3.2. Costs of common facilities

To measure preferences for common facilities with consideration of the associated costs, the costs per common facility need to be determined. This paragraph will therefore address the calculation of- and the actual costs per common facility.

Within the real estate sector, the significant distinction is made between the real estate development and real estate exploitation phase – whereby the development phase is further segmented into smaller sub-phases. During the development phase, activities are focused on the establishment and realization of the real estate / project (development, design and construction activities) whereas throughout the exploitation phase, the real estate is actually used and exploited (Peek & Gehner, 2018). Besides a differentiation in activities, these two phases also demonstrate a difference in their associated costs. During the development phase, the initial investment costs are applicable for the development and realization of the project. The initial investment costs (in Dutch 'stichtingskosten') concern all costs necessary for the development and realization costs of the project, and include costs for land, design, advisors, construction, interest and municipal fees (De Haan, 2023; Peek & Gehner, 2018). Subsequently, during the exploitation phase, exploitation costs are relevant. In contrast to the initial investment costs – which concern one-off costs – exploitation costs are periodically and recurring, and include costs for maintenance, insurances, taxes, energy use and municipal taxes (Van der Meijden Vastgoed, 2023).

This research will exclusively consider the initial investment costs of common facilities, since the primary objective is to obtain initial insights into preferences for common facilities, and the influence of costs on these preferences. Through this approach, essential foundational insight will be obtained instead of already including exploitation costs which (significantly) increases the complexity of the research and questionnaire. In addition, Peek and Gehner (2018) state that within the real estate sector primary decisions on whether to proceed with a project are based on the initial investment costs too, whereby the exploitation costs are (initially) disregarded.

The costs of common facilities within the questionnaire are based on realistic and market-based costs, with the objective of establishing a reliable and realistic representation of the influence of costs on the preferences for common facilities. In appendix C, the initial investment cost calculations are elaborated for each common facility separately. To the extent possible, these calculations rely on data, measurements and insights obtained from the analyzed reference projects and other relevant sources of information. In cases where clear and unambiguous data was not available, it was imperative to make certain assumptions – which are mentioned per common facility when applicable. The initial investment costs per common facility encompass not only the construction and additional costs, but also include costs for interior finishing and furnishing. To illustrate, for common facilities such as the living room, kitchen with dining area and guest room, budgets for furnishing and décor are included too. In table 4, an overview of the initial investment costs per common facility is given – based on the calculations in appendix C – including a further breakdown of these costs per dwelling.

To fund the initial investment costs of the common facilities, the assumption is made that each household finances 1/25th of the initial investment costs of the common facility – based on a co-housing project consisting of 25 dwellings – within the mortgage of their private dwelling. By this approach, the initial investment costs for the common facilities are covered on a monthly basis by the co-housing residents. Within the Netherlands, the two most common mortgage types concern the annuity mortgage and the linear mortgage, both consisting of interest and principal payments. As the annuity mortgage is the most common of these two (De Hypotheker, 2023a), this mortgage type will serve as calculation method in determining the monthly costs of the common facilities.

For the annuity mortgage it holds that the monthly payment amount remains constant throughout the entire mortgage term, in contrast to the linear mortgage where the monthly payment amount decreases overtime (De Hypotheker, 2023a). The monthly payment amount of the annuity mortgage is calculated by the following formula:

$$\text{Monthly fee} = \text{mortgage amount} * \text{interest/month} / (1 - (1 + \text{interest/month}) \text{ ^ - n}) \quad (7)$$

Where, mortgage amount = total initial investment costs, interest/month = monthly amount of interest = (1 + interest/year) ^ (1/12) – 1, and N = mortgage loan term in months.

For this calculation an interest rate of 4.43% is applied, which concerns the average interest rate of the three biggest banks in the Netherlands – ING, Rabobank, ABN AMRO (Hypotheekrentetarieven, 2023). Furthermore, the average Dutch mortgage term of thirty years is maintained (De Hypotheker, 2023b). Appendix D gives an overview of the monthly mortgage fee calculations, and table 4 provides insight in the monthly mortgage fee per co-housing household, per common facility (right column).

Table 4: Total initial investment costs and monthly mortgage costs, per common facility.

Facility	Total initial investment costs €	Initial investment costs per dwelling €	Monthly mortgage fee / household €
Living room	183,436	7,337	36
Kitchen with dining room	207,636	8,305	41
Shared bike parking	176,563	7,063	35
Hobby room / atelier	107,690	4,308	21
Guest room	78,771	3,151	16
Library / office room	109,800	4,392	22
Laundry room	59,835	2,393	12
Exercise room / gym	189,486	7,579	38
Wellness	186,437	7,457	37
Garden with terrace	117,975	4,719	23
Vegetable garden + greenhouse	18,150	726	4
Jeu de boules court	12,197	488	2
Outdoor kitchen	66,792	2,672	13
Swimming pool	87,120	3,485	17
Shared mobility	Not applicable	Not applicable	35

What needs to be noted is that the initial investment costs of the common facilities also include budgets for décor and furniture, which in turn are included in the mortgage of thirty years too. Furniture and décor usually not have a lifespan of thirty years and from an accountancy perspective these items are even depreciated over a period of ten years (Senden, 2023). Nevertheless, to keep this calculation example manageable, no distinction is made between the thirty-year mortgage fee payment and a different depreciation period for décor and furniture. With respect to the monthly fee for shared mobility, this sum is not based on a mortgage calculation but rather on a monthly lease price. In conclusion, the monthly mortgage fee per household is rounded to a whole number, since individuals perceive these as more convenient compared to 'just-below prices' (Wieseke et al., 2015).

3.4. QUESTIONNAIRE

After an explanation of the research methodology and the to be included common facilities within the questionnaire, this sub-chapter delves into the questionnaire itself. The questionnaire concerns an online survey, established by using LimeSurvey. In the subsequent paragraph, a discussion on the design and structure of the questionnaire follows. Hereafter, the applied levels per variable are explained and substantiated. For the complete questionnaire setup, reference is made to appendix E.

3.4.1. Questionnaire design

This paragraph provides an elucidation on the questionnaire design, employing a subdivision to structure the questionnaire; introduction page, consent page, part 1, introduction part 2, part 2A, part 2B, part 3, and in conclusion an outro page.

Introduction page

The online questionnaire will start with an introduction page, where the researcher briefly introduces himself. Hereafter, the context and background of the research are be explained, as well as the concept of co-housing, and the research question which stands central within this research. Subsequently, the structure of the questionnaire is explained. Moreover, it is mentioned that taking part in the questionnaire is voluntary and anonymous. Additionally, the expected duration of the survey is noted.

Consent page

After the introduction page, a consent page follows where respondents can read the general terms and conditions of the questionnaire with respect to data management, ethics and privacy, and possible risks and inconveniences. When respondents consent, the questionnaire starts. In case when a respondent expresses the reluctance to participate, the questionnaire automatically terminates.

Part 1: Housing situation

When respondents consent, the first part of the questionnaire starts, where two questions follow with respect to respondents housing situation; the dwelling type they are currently living in and home ownership status. Subsequently, a question follows regarding respondent's familiarity with the co-housing concept, and whether or not they already dispose of common facilities in their current housing situation. In conclusion, respondents are also asked whether they ever use sharing economy facilities, with the purpose to more comprehensively delineate the characteristics of the research group, and explore potential correlations regarding the disposal of and preferences for common facilities.

Part 2: Introduction

After part 1, the substantive part related to preferences for common facilities follows. Given the distinction in the research objective between preferences for common facilities without costs, and preferences whereby costs have to be taken into account, this division is also applied in the structure of the questionnaire: a separate section related to the most preferred common facilities (part 2A) and a separate section regarding the most preferred common facilities in consideration of the associated costs of these facilities (part 2B).

Before moving on to the questionnaire part related to preferences for common facilities, respondents will be asked to image they are going to move to a (fictive) co-housing project. Within this project, each household will dispose of their own private dwelling, alongside which one or multiple common facilities will be realized – to be aligned with the personal preferences of the future residents. Hereby, a list of fifteen possible common facilities is shown, based on the selection as discussed in sub-chapter 3.3. This list reads as follows:

- Library room with workplaces;
- Outdoor kitchen with canopy;
- Outdoor swimming pool;
- Shared car service;
- Shared bike parking (indoor);
- Garden with terrace;
- Vegetable garden with greenhouse;
- Hobby room / atelier;

- Jeu de boules court;
- Kitchen with dining room;
- Guest room with private bathroom;
- Exercise room with sport equipment;
- Laundry room with washing machines and dryers;
- Wellness area with sauna and jacuzzi;
- Living room;

Part 2A: Evaluation by ranking, without costs

After the introduction, the part related to preferences for common facilities follows. For answering this part, the list of fifteen common facilities is represented whereby respondents are asked to distill and rank their top six out of this list (see paragraph 3.3.1 for the decision of six ranking items); from top to bottom from most to least preferred. Within this part, no costs are mentioned yet so that a clear overview on the hierarchy of preferences concerning common facilities will be obtained, without the influence of the associated costs of those facilities.

Part 2B: Evaluation by ranking, with costs

Subsequently, part 2B of the online questionnaire follows which also concerns an evaluation by ranking. For this ranking, the same common facilities are included as at part 2A. However, this time each facility is also foreseen of its associated costs, whereby these costs have to be taken into account at evaluating the common facilities by ranking from most to least preferred. At the start of part 2B, respondents will be well informed about the composition and purpose of these costs: a monthly fee, for financing the development and realization of the common facilities. The applicable monthly fees are in line with the costs as discussed in paragraph 3.3.2, table 4.

Part 3: Personal characteristics

After completing both evaluation by rankings, part 3 follows, where respondents will be asked about their personal characteristics. This with the purpose to identify the characteristics of the respondents, and to evaluate if personal characteristics correlate with preferences for common facilities. Personal characteristics can namely be used to prove that individual's preferences may not necessarily be random, but can vary systematically and/or are related to some personal characteristics (Markandya et al., 2019). Personal characteristics that will be asked for include residence/postal code, gender, age, education level, household composition, household size, employment status, profession field and household income. Subsequently, part 3 will be finished with the question about the extent to which respondents have become interested in co-housing, after completing the survey.

Outro / closure

Finally, an outro follows to conclude the online questionnaire. In this outro, respondents are thanked for their participation, and there is the possibility to leavy any questions and/or comments.

3.4.2. Variables and levels

Besides the two evaluation by ranking experiments, the questionnaire also includes questions with respect to respondents' current housing situation and personal characteristics. This paragraph provides an explanation on the applied levels for these variables.

Part 1: Housing situation

The questions in part one are related to the respondents current housing situation, compromising the home ownership status and dwelling type. Furthermore, two questions related to co-housing and common facilities follow, after which a question follows with respect to the sharing economy.

The variable 'home ownership' is dived into owner-occupied, rental sector – housing association, and rental sector – private rental sector dwellings, according to the division of CBS (2023e). With regard to 'dwelling type', the distribution according to Hoogakker (2022) is followed, whereby the most common dwelling types are included such as a detached house, semi-detached house, corner house, terraced house, bungalow and an apartment.

After the questions regarding respondents current housing situation, two questions related to co-housing and common facilities follow. The levels for the question regarding familiarity with co-housing are divided into three options, as listed in table 5. Subsequently, the levels of the question related to the disposal of common facilities within respondents current housing situation are in line with the common facilities to be included in the evaluation by ranking, as discussed in sub-chapter 3.3.

In conclusion of part 1, the levels applied for the question on taking advantage of the shared economy are based on the levels applied in the research of Nadeem et al. (2023) on consumers' willingness to pay in the sharing economy.

Table 5: Variables and levels – questionnaire part 1.

Variables	Levels
Home ownership	• Owner-occupied dwelling • Rental dwelling – housing association • Rental dwelling – private rental sector
Dwelling type	• Detached house • Semi-detached house • Corner house • Terraced house • Bungalow • Apartment • Otherwise, namely …
Familiarity with co-housing	• No, I haven't heard of this before • Yes, I have heard of it, but I have never had any experience with it • Yes, I have heard of it, and I have also had some experience with it
Common facilities in current housing situation	• No • Yes, a living room • Yes, a kitchen with dining room • […] • Yes, otherwise, namely …

Sharing economy	• No • Yes, weekly • Yes, monthly • Yes, quarterly • Yes, half-yearly • Yes, yearly

Part 3: Personal characteristics

The questions in part three are related to personal characteristics of the respondents. The characteristics adopted in this study concern postal code, gender, age, education level, household composition, household size, employment status, profession field and household income. In conclusion, a question follows on how interested respondents are in co-housing, after completing the survey. Table 6 gives an overview of the variables, including the applied levels.

According CBS (2023c), the variable 'gender' is used to distinguish male and females. Nevertheless, this study also includes a category for respondents who do not want to indicate their gender. Subsequently, the variable 'age' is divided into categories of 5 years, whereby all categories together encompass the target group of this research: people aged between 50 and 80 years old.

With respect to the variable 'education level', the levels applied follow the categorization according to the Dutch ministry of Education, Culture and Science (Ministerie van OCW, 2022). However, the various Dutch secondary school and Lower and Intermediate Vocational Education levels have been merged (mavo, havo, vwo and mbo niveau 2-4) to keep the number of levels manageable.

For the variable 'household composition', the division of levels is based on the Dutch national housing survey (Stuart-Fox et al., 2022). With respect to 'household size', this concerns the number of people that make part of a private household. The Dutch Youth Institute has compiled an overview of the distribution of the number of children per household in the Netherlands, whereby a division is made between one, two and three or more children per household (NJi, 2022). Assuming one to two parents per household, this results in levels varying from 1 to 5 or more persons per household.

After household size, 'employment status' follows, from which the applied levels result from the labor participation rate numbers of CBS (2023d). Although, to specify the unemployed workforce, a further breakdown has been applied. Subsequently, respondents are also asked about their 'profession field'. For this variable, the classification according to CBS (2022c) is applied, whereby a distinction is made between seventeen different profession fields.

For the demographic question on 'household income', the levels are classified according to the national modal gross income of approximately €40,000 in 2023 (CPB, 2023). The household income concerns the gross annual income of the total household (household head and partner). To conclude, the final question asks to what extent respondents are interested in co-housing, after accomplishing the survey. The applied levels for this variable are based on a 5 point scale, from strongly uninterested to strongly interested.

Table 6: Variables and levels – questionnaire part 3.

Variables	Levels
Residence / postal code	[to be specified]
Gender	• Male • Female • Other / I would rather not say
Age	• ≤ 49 years • 50 – 55 years • 56 – 60 years • 61 – 65 years • 66 – 70 years • 71 – 75 years • 76 – 80 years • ≥ 81 years
Education level	• Primary school • Secondary school • Lower Vocational Education (In Dutch LBO) • Intermediate Vocational Education (In Dutch MBO) • Bachelor's Degree (HBO or University) • Master's or Doctoral Degree • Other • I would rather not say
Household composition	• Single • Cohabiting with partner, without children • Cohabiting with partner, with children • Single-parent family • Otherwise, namely … • I would rather not say
Household size	• 1 person • 2 persons • 3 persons • 4 persons • 5 or more persons
Employment status	• Fulltime (35 or more hours per week) • Parttime (20 to 35 hours per week) • Parttime (less than 20 hours per week) • Not working; retired • Not working; unemployed / unfit to work • Not working; other • I would rather not say
Profession field	• No longer employed • Business services • Healthcare

	• Trade • Industry • Education • Construction • Public administration • Hospitality • Culture, recreation, and other services • Transportation and storage • Information and communication • Agriculture and fisheries • Financial services • Real estate rental and trade • Water companies and waste management • Energy supply • Mining • Otherwise, namely …
Household income	• 0 to ½ modal salary: €0 – €20,000 • ½ to 1 modal salary: €20,001 – €40,000 • 1 to 1½ modal salary: €40,001 – €60,000 • 1½ to 2 modal salary: €60,001 – €80,000 • More than twice modal salary: > €80,000 • I would rather not say
Degree of interest in co-housing	• Strongly uninterested • Uninterested • Neutral • Interested • Strongly interested

3.5. POPULATION AND DATA ACQUISITION

Within this sub-chapter, an explanation is given on the population (target group) within this research, followed by a sub-chapter on the data acquisition process.

3.5.1. Population

This research focusses on elucidating the preferences of elderly for common facilities within co-housing projects. However, Market Response (2020) and Vrieler and Ter Heegde (2018) conclude that the population group of 'elderly' is more diverse than ever before, making it crucial to demarcate this target group. Following CBS (2023a), individuals aged 65 and older are classified as 'elderly'.

To ensure the value and applicability of the outcomes of this research in the medium and long term, it is essential to gain insight into the preferences of 'future' elderly too, with respect to common facilities. Nevertheless, there appears to be no clear consensus regarding a further subdivision of age categories among adults. Therefore, the age categorization as proposed by Tebbens and Vonk (2022) is adopted, who classify adults into the following age groups: adolescence (19 – 25 years), adults (26 – 40 years),

middle-aged adults (41 – 50 years), 50 plussers (50 – 64 years) and elderly (65 years and older). For 'future elderly', the age group of 50 plussers is maintained, preceding the elderly category. Altogether, this results into a targeted research group with an age ranging from 50 to 80 years. These individuals form the 'unit of analysis' within this research.

Another justification for including 'future' elderly in this research arises from the observation that individuals aged in their fifties show an above average willingness and interest to move, due to two significant life-altering events; the children who leave the house and the gradual approach of retirement (Vrieler & Ter Heegde, 2018). Furthermore, adults aged around their fifties are becoming increasingly aware of the fact that they get more vulnerable as they age (Market Response, 2020) wherewith the desire for a lifetime compatible dwelling and supportive living environment increases (Vrieler & Ter Heegde, 2018; Market Response, 2020).

3.5.2. Data acquisition

In order to acquire the necessary data, the previously delineated target group – consisting of individuals aged between 50 and 80 years – has been approached, solicitating their willingness to participate in this research by completing a questionnaire. The questionnaire concerns a digital/online version, established through LimeSurvey, allowing for digital data collection and storage. A significant advantage of using this digital application, is that respondents can complete the survey at any given moment, wherewith the threshold to participate reduces. Furthermore, the digital questionnaire allows for an efficient and easy distribution.

The outreach to the target group took place through various means, both online as well as 'physical'. Online, the questionnaire has been distributed via e-mail to the personal network of the researcher, compromising of family, friends and acquaintances. Also professional connections have been contacted through an extensive database of business email contacts. Furthermore, the questionnaire has been shared by e-mail with two clubs/organizations, namely the local bridgeclub and mountain bike club of Weert (the place of residence of the researcher). In conclusion, three co-housing associations were willing to distribute the questionnaire among their organization and/or newsletter members; Kilimanjaro Wonen, Cooplink and LVGO. In total, about 3,200 individuals have been reached through e-mail and newsletters.

Subsequently, the questionnaire has been distributed 'physically' by flyers, on which the researcher briefly introduced himself and a concise explanation on the research followed. Moreover, the flyers were foreseen of an URL-link, redirecting to the LimeSurvey questionnaire. The flyers have been distributed through mailboxes in the direct living area of the researcher. Through this physical approach, approximately 100 individuals have been approached.

3.6. CONCLUSION

Within this chapter, the research plan has been discussed, compromising the research and analysis method, the to be included common facilities within the ranking experiment and their associated costs, the questionnaire design and lastly the population and data acquisition strategy. With regard to the research method, an evaluation by ranking will be applied, whereby respondents have to rank six common facilities from most to least preferred out of a list of fifteen alternatives. The choice for this method is based on the fact that to date, no research has been conducted on preferences for common facilities

within co-housing projects, and that this method provides initial insights into preferences for separate common facilities, within a co-housing project. Moreover, this method concerns a convenient, manageable and accessible method for the respondents. Subsequently, the results will be analyzed by use of a rank-ordered logit model, which is considered as the most suitable for analyzing ranking data on individual preferences from a set of alternatives. Eventually, the estimated models (without and with costs) will be evaluated by use of a Log-likelihood Ratio Statistic and the McFadden Pseudo R^2.

In order to acquire the necessary data, an online questionnaire has been established in which respondents are asked towards personal characteristics, including gender, age, education level and household. Furthermore, in order to study preferences for common facilities without and with consideration of costs, the questionnaire contains two evaluation by ranking experiments in which respondents are asked to distill and rank their personal top six out of a list of fifteen common facilities. In the first ranking experiment, the common facilities are displayed without costs. In turn, in the second ranking experiment each common facility is foreseen of its associated costs, whereby these costs have to be taken into account by the respondent. The fifteen included common facilities are based on the analyzed reference projects and their associated costs are in line with the total investment costs per common facility, discounted to a monthly contribution per household.

For the population it holds that this research focusses on preferences of elderly and 'future' elderly, in order to ensure the value and applicability of the results of this research in the medium and long term. Herewith, the targeted research group consists of individuals from 50 to 80 years. This research group will be approached online, through the personal and professional network of the researcher, as well as a number of organizations who distributed the questionnaire among their members. Furthermore, the questionnaire has also 'physically' been distributed by door to door distribution of flyers, foreseen of an URL-link redirecting to the online questionnaire.

4. RESULTS

Within this chapter, the results will be presented and discussed. In the first sub-chapter, the characteristics of the respondents will be addressed, consisting of personal characteristics (sample description) and a sample experience. Subsequently, the results of the rank-ordered logit model on preferences for common facilities with and without costs will be discussed. After this analysis on the entire sample, an elucidation of sub-groups on five themes will ensue, followed by a sub-group analysis.

4.1. CHARACTERISTICS OF RESPONDENTS

Data acquisition took place from 30 November 2023 until 15 January 2024. In total, 3,300 individuals have been researched of which 551 have started the questionnaire. Subsequently, the questionnaire has been completed by 441 individuals, which constitute the sample within this research. Appendix F gives an overview of the sample characteristics according to the answer categories, as included in the survey. However, in the sample description below, these categories have been condensed, in accordance with the categorization as applied by several Dutch statistical institutions, such as CBS.

Moreover, in the context of this study, the term 'convenient sample' is employed (Edgar & Manz, 2017) because a share of the respondents is acquired through the personal and professional network of the researcher. Besides, this could potentially result in an overrepresentation of males, given the researchers professional background within the construction and real estate sector, in which males have the upper hand, in comparison to females (Vastgoedmarkt, 2023). Moreover, it is expected that older age categories are strongly overrepresented, as this demographic group has specifically been targeted during the data acquisition process.

4.1.1. Sample description

Examining the gender distribution, it can be asserted that the majority of the sample consists of males, which is in line with the expectations of the convenient sample. Nevertheless, this gender distribution indicates a reasonable deviation from the overall population – individuals aged fifty and older – since the Dutch male-female ratio comes down to 47.9% versus 52.1% among individuals aged fifty years and older (CBS, 2022f).

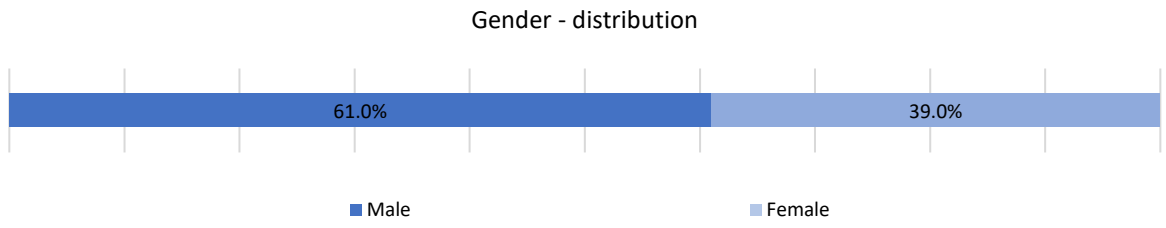

Figure 4.1: Gender distribution of respondents.

Looking at the age distribution of the sample in figure 4.2, the age category of respondents of 50 to 65 years is most strongly represented, after which the age category of 66 to 80 years follows. In turn, share of respondents aged below 50 years is rather limited. All in all, this signifies that the target group of individuals aged between 50 and 80 years, accounts for a substantial 78.9% of the total sample. Consequently, the age distribution of the sample differs considerably from the overall Dutch age distribution, due to the particular approach of individuals aged between 50 and 80 years. At a national level, this age group accounts namely for 36.2% (CBS, 2023f).

Subsequently, the education level distribution of the respondents is displayed in figure 4.3. For this characteristic it holds that almost half of the respondents disposes of a bachelor's degree, followed by a master's or doctoral degree. Respondents with an intermediate vocational education level (in Dutch 'mbo') were less represented, accompanied by the scarce group of respondents who finished primary, secondary or lower vocational education. The education level distribution of the sample differs considerably from the national average, where the largest share of the population (39.0%) disposes of an intermediate vocational education degree, followed by a bachelor's degree (25.0%), primary, secondary and lower vocational education degree (20.0%) and a master's degree (16.0%) (Sociaal Cultureel Planbureau, 2020).

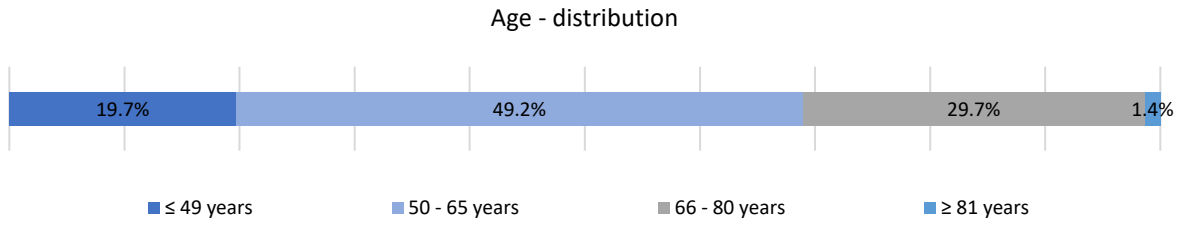

Figure 4.2: Age distribution of respondents.

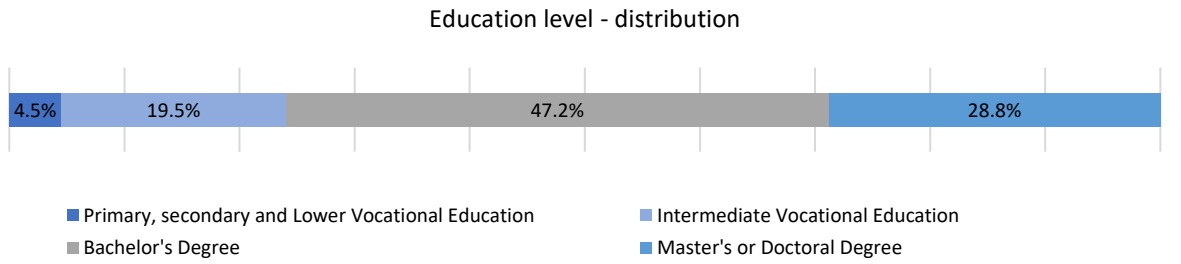

Figure 4.3: Education level distribution of respondents.

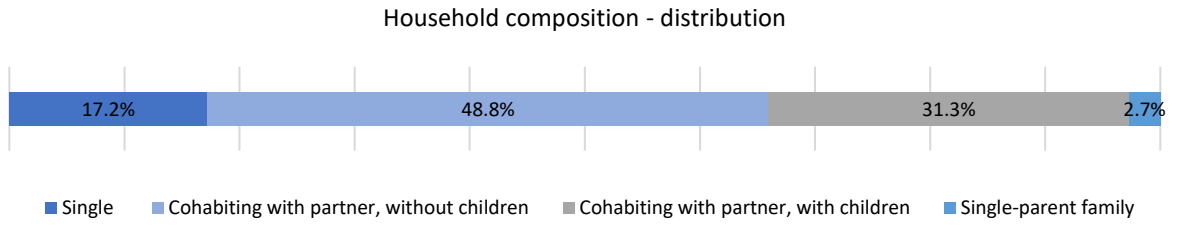

Figure 4.4: Household composition distribution of respondents.

Looking at household composition (figure 4.4) and household size (figure 4.5), it can be stated that the great majority of the respondents cohabit with a partner and without children, after which a household composition characterized by cohabiting with a partner and children comes. For household size, it holds that more than one half of the respondents is part of a two-person household. Households consisting of one, three or four individuals are approximately evenly distributed. Comparing these ratio's with the characteristics of the Dutch individuals, the household composition distribution almost perfectly aligns with a national share of 18.0% of the individuals who form a single-person household, 49.0% who cohabit with a partner, 26.0% who cohabit with a partner and with children, and 3.0% who constitute a single-parent family (CBS, 2023g).

Nevertheless, what stands out is the deviation regarding household size, whereby 39.5% of all Dutch households consist of single person households (CBS, 2023h). A plausible explanation for this deviation is that single-person households primarily consist of younger individuals (CBS, 2023g), whereas this demographic group is severely underrepresented in this study due to the convenient sample.

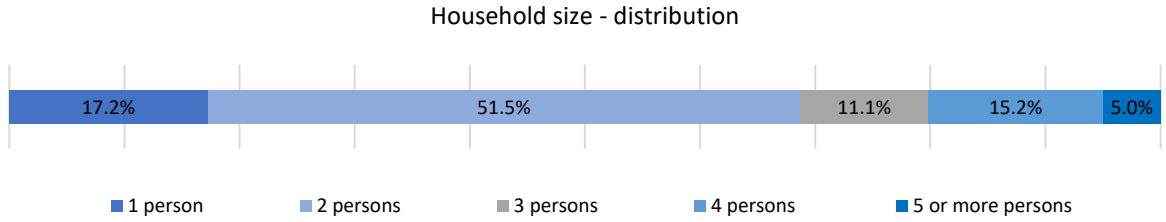

Figure 4.5: Household size distribution of respondents.

Since 68.9% of the respondents is aged below 65 years – which is below the retirement age (Rijksoverheid, 2020) – a significant share of the sample is still actively engaged in the labor market. Subsequently, of the working respondents, the majority is engaged in fulltime employment. The second largest group concerning employment status are retired individuals, that percentage-wise approximate the share of individuals aged 66 years and above. Comparing these percentages with the national average, where 36.4% works fulltime and 33.7% works parttime (CBS, 2023d; CBS, 2023i), fulltime employed individuals are overrepresented within the sample and parttime employed individuals are underrepresented. A probable cause of this deviation can be attributed to the convenient sample in which males are overrepresented, who significantly more often engage in fulltime employment (Nederland in cijfers, 2022). Subsequently, the proportion of retired respondents approximately corresponds with the national average of 25.9% (CBS, 2023i).

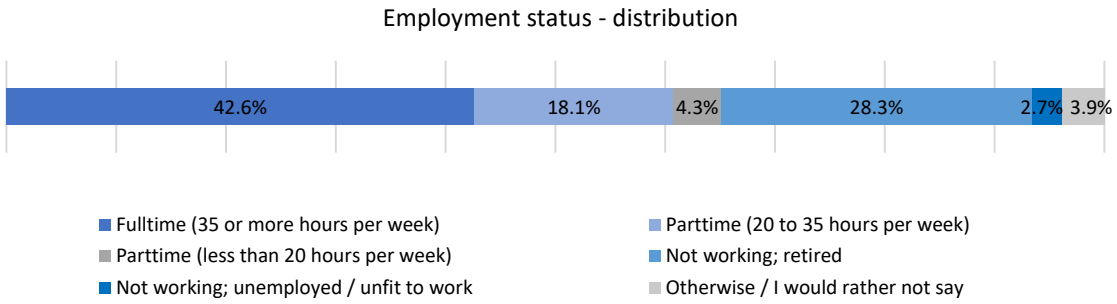

Figure 4.6: Employment status distribution of respondents.

Examining respondents current profession field, the largest group indicates to be no longer employed. For the working part of the sample, the majority indicates to be engaged within the construction sector, followed by business services, healthcare and the education sector. The overrepresentation of respondents engaged in the construction sector – compared to the national average of 4.3% (CBS, 2022c) – can consequently be explained through the convenient sample.

A substantial discrepancy is noticeable within the household income distribution, when comparing this with the national distribution. Of all respondents 34.0% indicates having a household income of more than twice a modal salary. Additionally, the household income categories from 1 to 1 ½ modal salary and 1 ½ to twice the modal salary are well represented too.

Though, the income category from 0 to 1 modal salary occurs significantly less, while on a national level this is particularly the most prevalent income category, namely among 74.8% of the Dutch households (CBS, 2023j). Following, 1 to 1 ½, 1 ½ to 2 and more than twice a modal salary only occur among 19.4%, 3.6% and 2.2% of the Dutch households (CBS, 2023j).

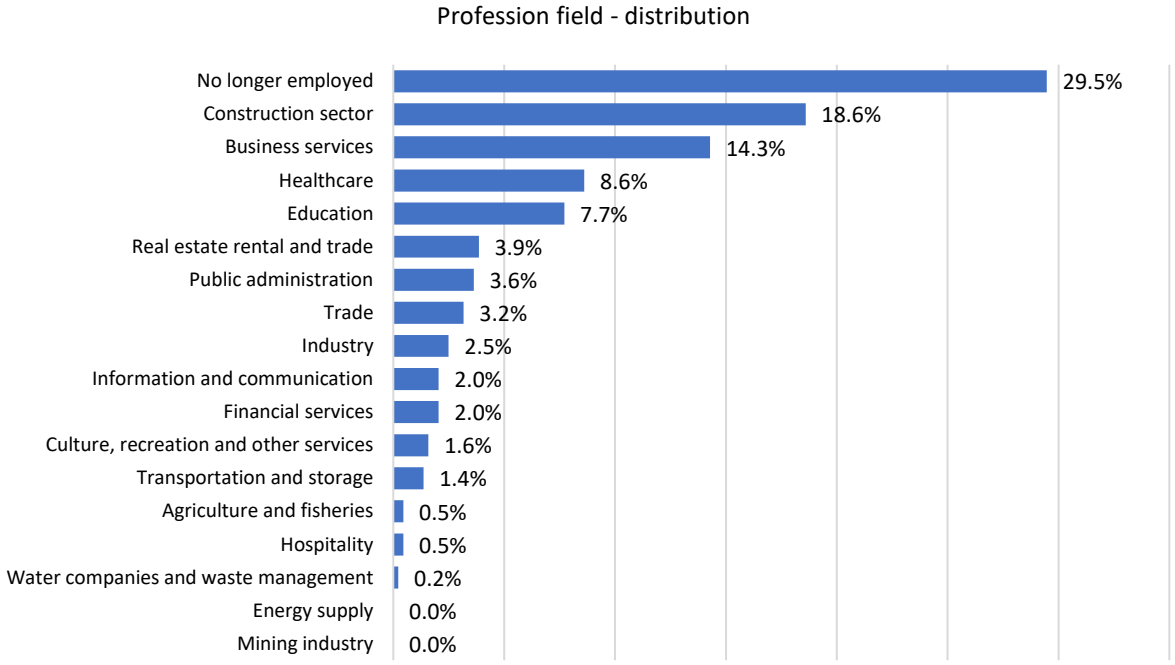

Figure 4.7: Profession field distribution of respondents.

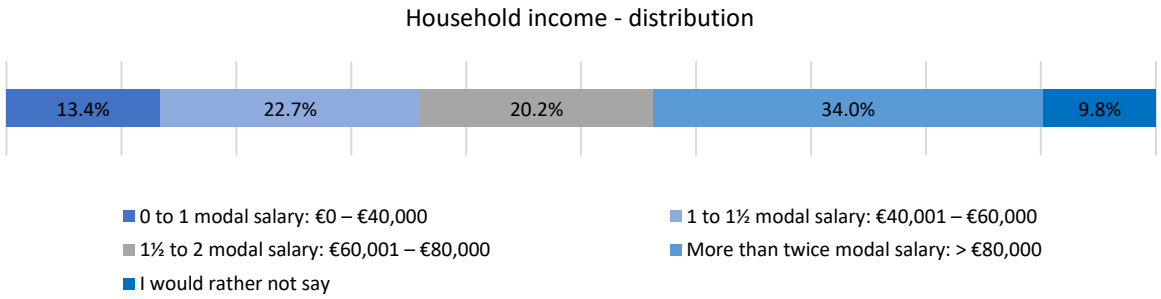

Figure 4.8: Household income distribution of respondents.

Analyzing the housing situation of the respondents, the great majority disposes of an owner-occupied dwelling, in contrast to the very small group who live in a rental dwelling. Comparing this distribution with the national housing stock, there appears to be a strong discrepancy since the Dutch housing stock consists of 57.3% owner-occupied dwellings, 28.6% social rental housing and 14.1% private rental properties (CBS, 2023e). Nevertheless, a contributing factor to this deviate distribution is the fact that 71.3% of individuals aged in their 50's and 60's (49.2% of the sample) dispose of an owner-occupied dwelling, according to CBS (2020b), which partially has an influence on the high share of owner-occupied dwellings within this research. Subsequently, most respondents indicate to live in a detached house, followed by a terraced house, semi-detached house, an apartment and a bungalow. Also these percentages differ from the national average, considering that 13.0% of the national housing stock consists of detached houses, 8.8% of semi-detached houses, 42.2% of terraced houses and 36.0% of apartments (CBS, 2022d; CBS, 2023k).

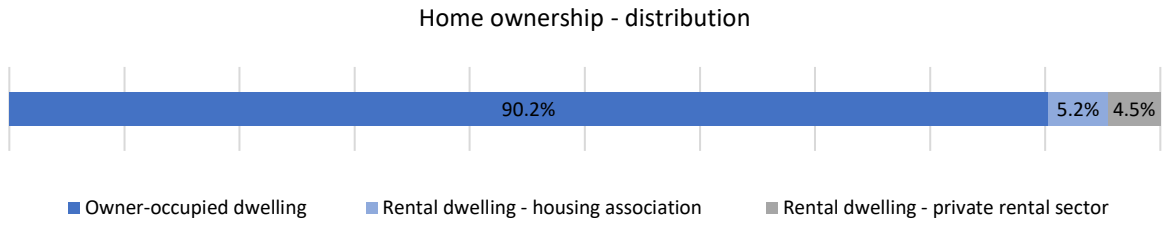

Figure 4.9: Home ownership distribution of respondents.

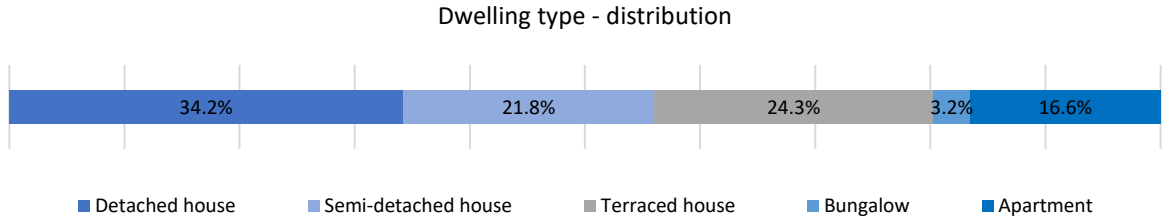

Figure 4.10: Dwelling type distribution of respondents.

Examining the characteristics of the respondents living area, the urbanization index of CBS (2024) was utilized as indicator. Within this index, a categorization of five levels has been applied, tapering down from very strongly urbanized, to strongly urbanized, moderately urbanized, limitedly urbanized and not urbanized. Following this distribution, a large share of the sample indicates to live in a very strongly to strongly urbanized area. Hereafter, a limitedly and moderately urbanized living area follow.

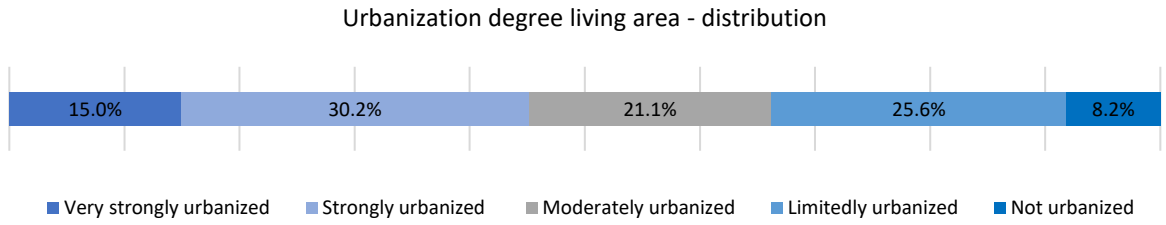

Figure 4.11: Urbanisation degree of respondents living area distribution.

4.1.2. Sample experience

Besides the personal characteristics of the respondents, an additional sample description has been developed regarding the sample's experience towards co-housing. Examining respondents familiarity with the concept of co-housing, more than one half indicates to have heard of it, but does not have any experience with the housing concept. Hereafter, the two groups of respondents follow who have not heard of co-housing before, and who are familiar with co-housing and also have experience with the concept.

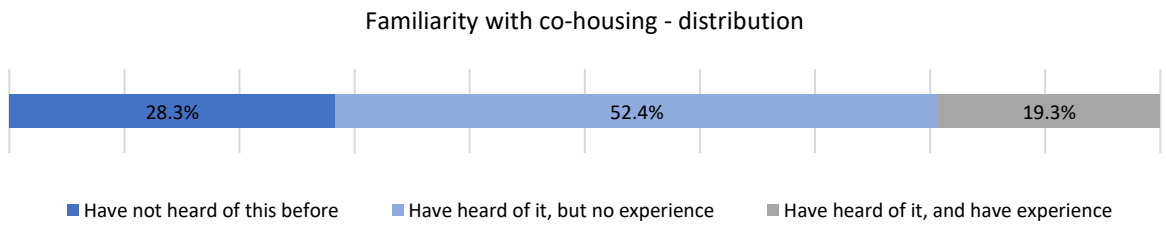

Figure 4.12: Familiarity with co-housing among respondents distribution.

Subsequently, 13.6% of the respondents indicates to dispose of common facilities in their current housing situation, versus the great majority who does not. Of the respondents who do dispose of common facilities in their current housing situation, figure 4.14 provides an overview of the most prevalent common facilities. The two most abundant facilities include the shared bike parking and the garden with terrace, after which the shared living room, laundry room, hobby room / atelier, and kitchen with dining room follow at some distance. This distribution is in broad terms in line with the most prevalent common facilities in the studied reference projects (see paragraph 2.2.3), where the shared bike parking, garden with terrace, living room, hobby room / atelier and kitchen with dining room are also positioned at the top.

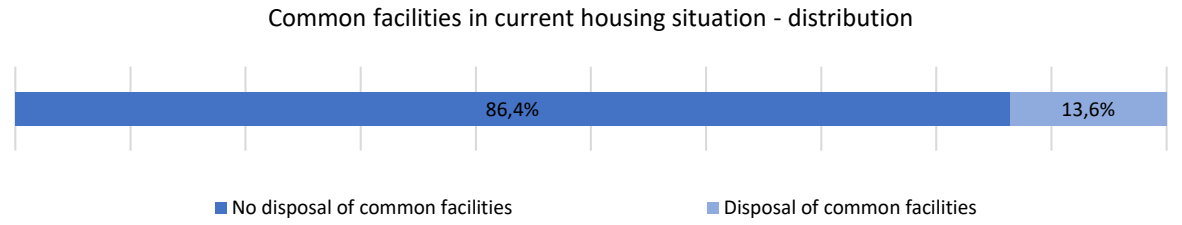

Figure 4.13: Disposal of common facilities in current housing situation among respondents distribution.

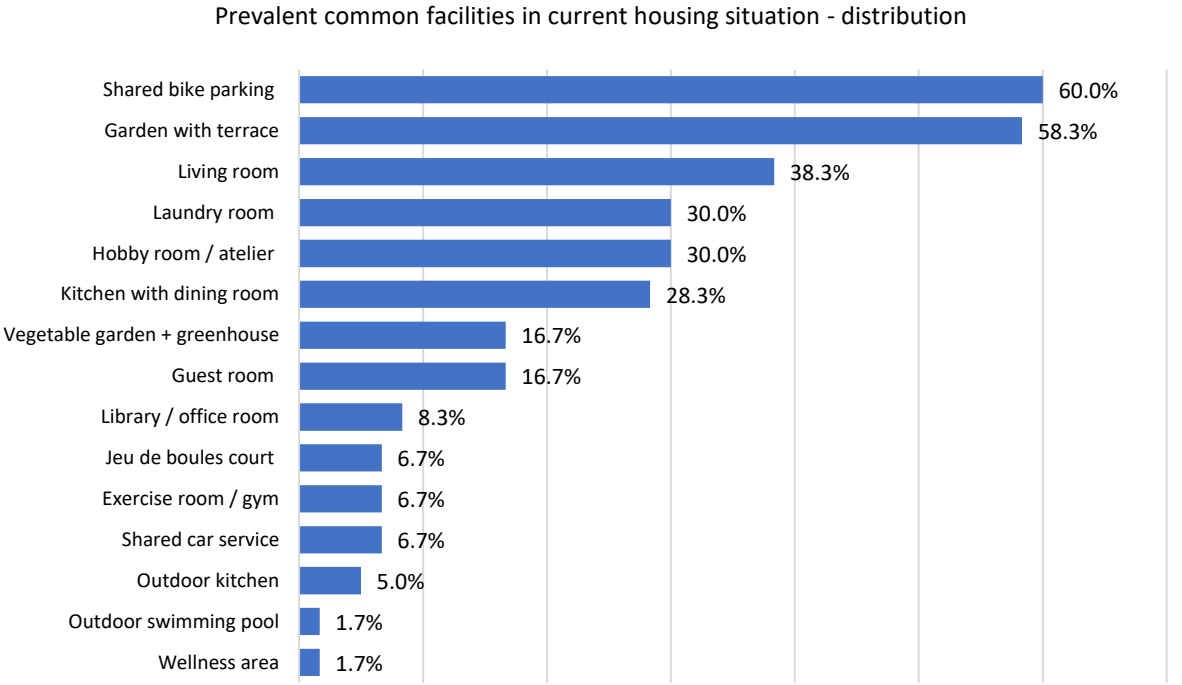

Figure 4.14: Prevalent common facilities among respondents who dispose of common facilities in their current housing situation distribution.

In addition to questions regarding co-housing and common facilities, respondents were also asked if they take advantage from the sharing economy and if so, on which basis. As figure 4.15 indicates, the great majority does not make use of the sharing economy. On the other end, 29.5% states to make use of the sharing economy, which is twice as much the national average of 15.0% (Hoekstra, 2018). This deviation is notable considering the convenient target group and the contradicting fact that users of the sharing economy consist primarily of individuals aged between twenty to forty (Hoekstra, 2018).

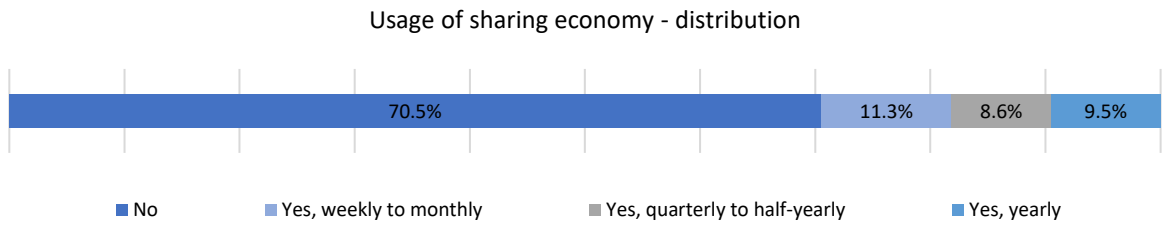

Figure 4.15: Usage of sharing economy among respondents distribution.

Lastly, respondents were asked to indicate their degree of interest in co-housing. More than half of the respondents indicated being (strongly) interested in co-housing. Subsequently, 27.9% stated to have a neutral perception and only 19.5% indicated to be (strongly) uninterested.

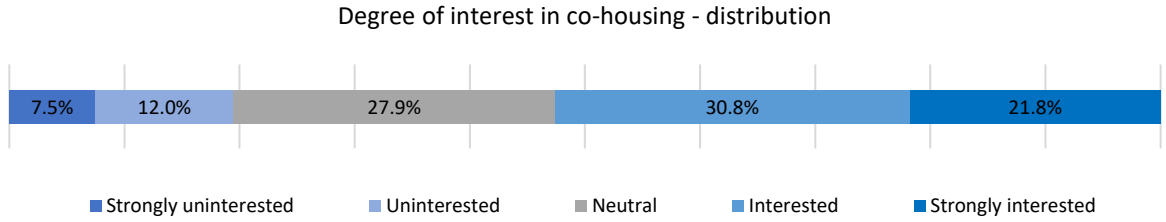

Figure 4.16: Degree of interest in co-housing among respondents distribution.

4.1.3. Bivariate analysis

Besides a description and explanation on the sample characteristics and sample experience, a number of bivariate analyses, including Chi-square tests, have been performed on various variables. This with the purpose of investigating whether empirical relationships between certain variables are present or not. The insights derived from these analyses can later be used to better interpret, clarify and/or confirm findings in the sub-group analysis. The variables included in the bivariate analysis compromise interest in co-housing, gender, age, education level and household composition. The results of the bivariate analyses and Chi-square tests can be found in appendix G.

Firstly, an analysis was conducted on the variable 'interest in co-housing', versus the other variables. It is found that females are in general more interested in co-housing, compared to males. 69.0% of the females indicates to be (strongly) interested in this housing concept, as opposed to 42.2% of the males (Chi-square = 42.559, $p < 0.001$). These findings are in line with the discussed literature in sub-chapter 2.3, whereby it is reported that females are in general more interested in co-housing, compared to men (Kvietkute & Hauge, 2022; Vestbro, 2010).

Subsequently, for the variable age it appeared that as individuals age, their level of interest in co-housing increases. Among individuals aged 49 years and below, 40.2% stated to be (strongly) interested in this housing concept, against 53.9% in the age category of 50 to 65 years and 58.4% among individuals aged 66 years and older. However, testing for independence, the Chi-square test implicates that a relationship between these variables cannot be statistically confirmed.

Looking at education level, interest in co-housing appears to increase along with individuals' education level. Individuals who completed a master degree indicate the highest level of interest, with 59.8% indicating to be (strongly) interested in co-housing. However, in line with the variable age, this correlation cannot statistically be confirmed, according to the outcomes of the Chi-square test.

Lastly, interest in co-housing was examined in relation to respondents' household composition. Distinctive is the wide range of interest. Singles show the highest interest in co-housing, as 69.7% indicates to be (strongly) interested. Hereafter, couples without children follow, with 55.8% stating to be (strongly) interested. On the other hand, families with children show the lowest interest (Chi-square = 38.473, $p < 0.001$). These outcomes follow findings in literature, whereby Kvietkute and Hauge (2022) state that the life stage and situation of singles and childless people/couples is the most suitable for co-housing, and that families/households with children consider co-housing as 'too premature' for their life stage.

After the bivariate analyses on interest, an analysis was conducted on gender versus age, education level and household composition. Looking at the results of the bivariate analyses, it appears that younger age categories consist relatively more of males, compared to older age categories. However, the Chi-square test proves that this relation cannot statistically be confirmed. In line with this conclusion, no correlation was found nor statistically confirmed between gender and education level.

Then, gender was examined in relation to household composition. The results indicate that the group of singles is predominantly represented by females (64.5%). On the other hand, it was found that males primarily reside together with a partner, perhaps without (64.7%) or with children (69.3%) (Chi-square = 26.359, $p < 0.001$).

Subsequently, a bivariate analysis is conducted on the variable age versus education level and household composition. Regarding age, it was found that individuals aged 66 years and older are in general less educated, and that the youngest age category (≤ 49 years) are strongly represented within the bachelor's and master's education categories, indicating a higher education level among this age cohort. For the middle age category (50 – 65 years) it is observed that these individuals fall somewhat in between, with an approximately equal distribution among the different education level categories (Chi-square = 27.899, $p < 0.001$).

Regarding household composition, within the middle and oldest age category, in particular singles and individuals cohabiting with a partner without children are represented. Among individuals aged 50 to 66 years, 48.7% are single and 38.2% cohabit with a partner, whereas 38.2% is single and 47.4% live together with a partner, among individuals aged 66 years and older. For individuals who cohabit with a partner and with children it holds that these are primarily present among the youngest and middle age category (≤ 49 years and 50 – 65 years) (Chi-square = 102.906, $p < 0.001$).

Lastly, a possible relation between education level and household composition has been assessed. The bivariate analysis shows that certain household compositions exhibit a higher education level, in comparison to others. Within the primary, secondary and lower vocational education level category, a small overrepresentation is observable among individuals who cohabit with a partner, without children. This also holds for the intermediate vocational education level. On the other hand, the bachelor education category is strongly represented among singles, with 61.8% of the singles disposing of a bachelor's degree. In turn, master's degrees are predominantly observed within households consisting of two partners, with children (Chi-square = 23.937, $p < 0.001$).

In conclusion of the bivariate analysis, empirical relations were found between interest in co-housing and gender, interest in co-housing and household composition, gender and household composition, age and education level, age and household composition, and education level and household composition. When interpreting the results of the sub-group analyses (sub-chapter 4.3), consideration will be given to these interrelationships.

4.2. PREFERENCES COMMON FACILITIES

The preferences for common facilities within co-housing projects, have been researched by analyzing the ranking data by a rank-ordered logit model in Nlogit. To explore the influence of the associated costs of common facilities on preferences, two models have been devised; one without and one with cots. In table 7, the fifteen common facilities are ranked from most to least preferred and foreseen of their utility score (based on estimated parameters), according to the outcomes of the ROL model. The two columns indicate the distinction between preferences without and with consideration of costs. With the establishment of the ranking, the living room functions as base alternative with a utility score of 0.000. Furthermore, a significance level of 95% has been applied, whereby the facilities described in black text do meet this significance level, and the facilities in grey text do not meet this level. For a further elaboration concerning the standard error, confidence interval, and z-value per model (without and with costs), reference is made to appendix H.

Table 7: Ranking from most to least preferred common facilities (each foreseen of its associated utility score).

Rank	Top 15 without costs	Top 15 with costs
1	Shared bike parking (1.395)	Vegetable garden with greenhouse (1.488)
2	Garden with terrace (1.090)	Garden with terrace (1.177)
3	Exercise room with sport equipment (1.022)	Shared car service (1.136)
4	Shared car service (1.007)	Laundry room (1.118)
5	Hobby room / atelier (0.955)	Shared bike parking (1.086)
6	Vegetable garden with greenhouse (0.907)	Hobby room / atelier (0.909)
7	Library room with workplaces (0.804)	Guest room with private bathroom (0.783)
8	Laundry room (0.713)	Library room with workplaces (0.777)
9	Guest room with private bathroom (0.605)	Exercise room with sport equipment (0.727)
10	Outdoor swimming pool (0.420)	Outdoor swimming pool (0.693)
11	Outdoor kitchen with canopy (0.288)	Outdoor kitchen with canopy (0.658)
12	Wellness area (0.257*)	Jeu de boules court (0.344)
13	Kitchen with dining room (0.091*)	Wellness area (0.031*)
14	Living room (0.000) → base alternative	Kitchen with dining room (0.029*)
15	Jeu de boules court (-0.491)	Living room (0.000) → base alternative

**Common facilities which do not meet the 95% significance level.*

Without the consideration of costs, the most preferred common facility concerns the shared bike parking, followed by the garden with terrace, exercise room with sport equipment, shared car service and the hobby room / atelier. Subsequently, when respondents face the common facilities with costs, a shift in preferences takes place. Now, the highest valued facilities include the vegetable garden with greenhouse, after which the garden with terrace, shared car service, laundry room and the shared bike parking follow.

Comparing both rankings without and with costs, a number of remarkable shifts are observable, when costs are taken into consideration. A common facility that sharply increases, is the vegetable garden with greenhouse, ascending from rank six to rank one. Herewith, this affordable facility with a monthly price of four euros is the most popular, with consideration of costs. In addition, the laundry room also increases in popularity, ascending from rank eight to rank four.

Subsequently, a common facility which proves to be highly preferred, is the garden with terrace, retaining rank two. What is more, in practice this also proves to be one of the most prevalent common facilities among existing co-housing projects. Another consistent and strongly preferred common facility is the shared car service, ascending from rank four to rank three. Somewhat remarkable, this facility ranks up high in the preference ranking, despite being infrequently encountered in practice. On the contrary, common facilities that rank low both without and with consideration of costs, are the outdoor kitchen with canopy and outdoor swimming pool. Moreover, despite having the lowest monthly costs among all facilities, the jeu de boules court also consistently ranks low.

Besides ascending and consistent common facilities, several decline in popularity. Although the shared bike parking remains in the top five most preferred common facilities with consideration of costs, this facility declines from rank one to rank five. The movement of this common facility within the top five reflects to some extent its popularity, which is in line with the fact that this facility prevalent occurs in existing co-housing projects. In addition, the exercise room shows a significant decline from rank three to rank nine. Lastly, it is remarkable that the living room and kitchen with dining room (although this facility is not significant) end up at the bottom of both rankings, since these are prevalent common facilities in existing co-housing projects (see paragraph 2.2.3 and paragraph 4.1.2).

After the discussion of both rankings, the log-likelihood of the estimated model will compared with the log-likelihood of the null model, resulting in a Log-likelihood Ratio Statistic (LRS). Herefore, the log-likelihood ratio test is applied, as described in paragraph 3.2.2. For the model without costs, the log-likelihood ratio test reads as follows:

$$LRS = -2\ (-7165.5008 - -6399.9419) = 1531.1$$

The critical Chi-square value with a significance level of 0.05 and 14 degrees of freedom (number of parameters), is 23.685. When the LRS value is larger than the critical Chi-square value, the models differ significantly from each other. In this case, the LRS value of 1531.1 is greater than the critical Chi-square value of 23.685 and so the models differ significantly from each other. Therefore, it can be concluded that the estimated model has a significant better score than the null model, wherewith the estimated model outperforms the null model.

Besides the log likelihood ratio test, also the McFadden Pseudo R^2 test has been carried out. The Pseudo R^2 of the current model without costs is:

$$R^2 = 1 - \frac{-6399.9419}{-7165.5008} = 0.106$$

According to McFadden (1974), an outcome between 0.2 and 0.4 indicates a good model fit. Based on these critical threshold values, this model is not satisfactory in its ability to predict. This relatively low performance is most likely attributable to the large number of choice alternatives, thereby diminishing the likelihood of any single alternative emerging as highly dominant within the total ranking.

Subsequently, also a log-likelihood ratio test for the model regarding preferences with consideration of costs had been conducted. For this model, the outcome is as follows:

$$LRS = -2\ (-7165.5008 - -6436.4826) = 1458.0$$

In line with the model without costs, also here a critical Chi-square value of 23.685 is applicable (based on a significance level of 0.05 and 14 degrees of freedom). Given that the LRS value is greater than the critical Chi-square value, the models differ significantly from each other. Based on this, it can be stated

that the estimated model has a significant better score compared to the null model, wherewith the estimated model outperforms the null model, and can be used to explain choices/preferences.

In closing, also for the model with costs the McFadden Pseudo R^2 test has been performed. The Pseudo R^2 of the model with costs is as follows:

$$R^2 = 1 - \frac{-6436.4826}{-7165.5008} = 0.101$$

Also for the model with costs it holds that it is not satisfactory in its predictive power, since the Pseudo R^2 value does not lie in between the threshold values of 0.2 and 0.4. As explained, this relatively low performance is most likely attributable to the large number of choice alternatives.

4.3. SUB-GROUP ANALYSIS

In addition to the rank-ordered logit analysis on the complete sample, this analysis method is also applied to conduct a sub-group analysis on a number of variables/themes. This with the aim to investigate the influence of personal characteristics on preferences, and to explore possible differences in preferences between sub-groups (see paragraph 3.2.2). In total, based on five themes, two sub-groups per theme have been established. These five sub-group analysis themes include (1) interest in co-housing, (2) income, (3) disposal of common facilities in current housing situation, (4) household composition and (5) urbanization degree of current living area. Firstly, an explanation on the five selected themes and the formation of the two sub-groups per theme follows in paragraph 4.3.1. Subsequently, for each theme a separate rank-ordered logit analysis has been conducted – without and with costs – to determine the preferences per sub-group (see appendix I) and to explore whether differences in preferences per sub-group occur. This analysis and its results are discussed in paragraph 4.3.2.

4.3.1. Sub-group establishment

In this paragraph, an explanation follows on the five selected themes that form the basis of this sub-group analysis, as well as the formation of sub-groups per variable.

Theme 1: Interest in co-housing

The first sub-group analysis is conducted based on the theme 'interest in co-housing'. Within literature, there are no references indicating that preferences for common facilities within co-housing projects rely on this variable. However, a sub-group analysis based on this theme is considered as relevant since it expected that individuals who are (strongly) interested in co-housing may have other preferences compared to individuals who are (strongly) uninterested in this collective housing concept. Moreover, preferences for common facilities among individuals who are (strongly) interested in co-housing are of above average relevance, since there is a greater likelihood that this group will eventually move to a co-housing project, in contrast to the group of individuals that are (strongly) uninterested in co-housing. On the other hand, co-housing projects could possibly be made more attractive to the uninterested cohort by considering their preferences within new co-housing developments.

In the questionnaire, respondents were presented five answer options when asked to indicate their degree of interest in co-housing; strongly uninterested, uninterested, neutral, interested, strongly interested. Based on these five answer options, two sub-groups have been established (see table 8), resulting

in approximately two equal groups; a group who is interested and a group who is uninterested or has not formed a clear opinion on the co-housing concept yet.

Table 8: Sub-group classification on theme 'degree of interest in co-housing'.

Degree of interest in co-housing	Frequency	Sub-group	Frequency	Percent
Strongly uninterested	33	1	209	47.4%
Uninterested	53	1		
Neutral	123	1		
Interested	136	2	232	52.6%
Strongly interested	96	2		

Theme 2: Income

The second sub-group analysis is conducted in accordance with 'income'. Within sub-chapter 2.3, possible influencing factors on preferences within the field of co-housing and social cohesion have been discussed. Hereby, Felix (2019) investigated individual's willingness to pay on various co-housing attributes, whereby the highest willingness to pay was found for common facilities. Furthermore, the latent class analysis showed that higher income groups have a higher willingness to pay for common facilities in comparison to lower income groups. Concerning influencing factors on social cohesion, income is repeatedly mentioned as an influencing variable too (French et al., 2014; Pampalon et al., 2017; Völker and Flap, 2007).

In addition to this substantiation derived from literature, it is interesting to assess whether individuals with higher incomes have different preferences and considerations towards common facilities within co-housing, both with and without costs. This with the expectation that preferences of individuals with higher incomes are less influenced by the monthly expenses of the common facility, thereby affording themselves greater autonomy in their decision making process.

In line with the sample description in sub-chapter 4.1, income has been categorized into five categories. For this sub-group analysis, two sub-groups have been established as given in table 9, namely a sub-group with a household income from 0 to 1½ modal salary (€0 – €60,000) and a sub-group earning a household income greater than 1½ modal salary (> €60,001). Subsequently, a substantial portion of the respondents (43 participants) indicated a reluctance to disclose their income. Given the significant proportion of this group within the total sample, this cohort has not been classified into a sub-group, but has been excluded from this sub-group analysis.

Table 9: Sub-group classification on theme 'household income'.

Household income	Frequency	Sub-group	Frequency	Percent
0 to 1 modal salary: €0 – €40,000	59	1	159	36.1%
1 to 1½ modal salary: €40,001 – €60,000	100	1		
1½ to 2 modal salary: €60,001 – €80,000	89	2	239	54.2%
More than twice modal salary: > €80,000	150	2		
I would rather not say	43	0	43	9.7%

Theme 3: Disposal of common facilities

The third sub-group analysis is performed based on the theme 'disposal of common facilities within the current housing situation'. In line with the first sub-group analysis, based on interest in co-housing, for this sub-group/variable there are neither direct indications found in literature that preferences with respect to common facilities may be influenced by this theme. However, a sub-group analysis based on this theme is considered as relevant, since individuals who dispose of common facilities in their current housing situation can indicate their preferences based on personal and practical experience. This in contrast to the group of individuals who do not dispose of common facilities in their current housing situation, and thus indicate their preference based on expectations.

In the questionnaire, respondents were presented two answer options when asked to indicate if they dispose of common facilities in their current housing situation; disposal versus no disposal of common facilities. For this sub-group analysis, this categorization is maintained (see table 10).

Table 10: Sub-group classification on theme 'disposal of common facilities'.

Disposal of common facilities	Frequency	Sub-group	Frequency	Percent
No disposal of common facilities	381	1	381	86.4%
Disposal of common facilities	60	2	60	13.6%

Theme 4: Household composition

The fourth sub-group analysis is conducted in accordance with 'household composition'. Referring back to sub-chapter 2.3, household composition is mentioned as relevant variable within the field of co-housing. Kvietkute and Hauge (2022) state that the life stage and situation of 'empty nesters' (adults/elderly whereby the children have left the house) and younger, childless individuals/households tend to be most suitable for co-housing. Subsequently, within the field of social cohesion (paragraph 2.3.2), household composition is mentioned as influencing variable too, whereby found that households having children are more likely to experience a greater degree of social cohesion with their neighbors (Völker & Flap, 2007; French et al., 2014; Frieling, 2008; Nguyen et al., 2020) as well as people having a partner (Oh & Kim, 2009; Shaw, 2005; Van der Wielen, 2017).

In line with the sample description in sub-chapter 4.1, respondent's household composition has been categorized into four categories; single, cohabiting with a partner without children, cohabiting with a partner with children and single-parent families. For this sub-group analysis, two sub-groups have been established in line with the findings in literature, namely a sub-group of households with children and households without children.

Table 11: Sub-group classification on theme 'household composition'.

Household composition	Frequency	Sub-group	Frequency	Percent
Single	76	1	291	66.0%
Cohabiting with partner, without children	215	1		
Cohabiting with partner, with children	138	2	150	34.0%
Single-parent family	12	2		

Theme 5: Urbanization degree living area

The final sub-group analysis is performed based on the theme 'urbanization degree of respondent's living area'. Within the literature review in sub-chapter 2.3, no references were found that stated that preferences for co-housing or social cohesion are influenced by the urbanization degree of individual's living environment. Although this relationship does not appear to have been investigated, various studies on housing preferences do refer to preferences for housing environments. In a research on elderly's housing preferences, Hoetjes (2022) found that the most preferred living environment concerns a traditional, green and spacious residential neighborhood. Hereafter, residing in a village center and a rural living area follow as most preferred residential environment.

Additionally, examing the relation between urbanization degree and social cohesion, mixed outcomes appear. Mouratidis and Poortinga (2020) found a negative correlation between neighborhood density and perceived social cohesion, although well-designed and vibrant urban neighborhoods can provide opportunities for social interaction, which is in line with the findings of other studies (Brueckner & Largey, 2008; French et al., 2014). On the other hand, Boessen et al. (2018) conclude that people living in a high density living area experience greater social ties.

In addition to the relation within literature between urbanization degree, housing environment preferences and social cohesion, it is concidered as relevant to investigate preferences among sub-groups based on the theme 'urbanization degree living area'. The expectation is namely that individuals residing in a (strongly) urbanized living area have different preferences for common facilities, compared to individuals living in a low urbanized or rural living area. On this basis, the sub-group categorization as given in table 12 is established, resulting in two substantial sub-groups.

Table 12: Sub-group classification on theme 'urbanization degree living area'.

Urbanization degree living area	Frequency	Sub-group	Frequency	Percent
Very strongly urbanized	66	1	199	45.1%
Strongly urbanized	133	1		
Moderately urbanized	93	2	242	54.9%
Limitedly urbanized	113	2		
Not urbanized	36	2		

4.3.2. Preferences of sub-groups

After an explanation on the formation of the sub-groups per theme, this paragraph elaborates on the outcomes of the sub-group analyses, based on the five themes. For each theme, the top five most preferred common facilities are presented per sub-group, without and with costs. The top five of each sub-group is primarily based on significant facilities with the highest utility. When fewer than five significant facilities emerged from the analysis, the top five is supplemented with other common facilities that exhibit a lower significance level. In appendix J, the tables with the utilities per sub-group can be found.

Theme 1: Interest in co-housing

For the sub-group analysis based on interest in co-housing, sub-group 1 represents the group of respondents who are not interested or who have not formed a clear opinion on the co-housing concept yet. On the other hand, sub-group 2 represents the (strongly) interested respondents.

	Without costs		With costs	
	Top 5 sub-group 1	Top 5 – sub-group 2	Top 5 sub-group 1	Top 5 – sub-group 2
1	Shared bike parking	Garden with terrace	Vegetable garden	Vegetable garden
2	Exercise room	Shared bike parking	Shared bike parking	Garden with terrace
3	Library room w/ workplaces	Shared car service	Exercise room	Shared car service
4	Hobby room / atelier	Vegetable garden	Laundry room	Laundry room
5	Garden with terrace	Hobby room / atelier	Outdoor swimming pool	Shared bike parking

Figure 4.17: Top five most preferred common facilities, for sub-group analysis on interest in co-housing.

Looking at the top five most preferred common facilities of sub-group 1 and sub-group 2 without the consideration of costs, the shared bike parking, hobby room / atelier and garden with terrace appear as the most popular common denominators within both sub-groups. With consideration of costs, both groups indicate high preferences towards the vegetable garden, laundry room and shared bike parking.

Subsequently, comparing preferences without and with costs for the uninterested sub-group, the exercise room and shared bike parking remain highly preferred. Nevertheless, the library room, hobby room / atelier and garden with terrace give way to three other common facilities, namely the vegetable garden, laundry room and the outdoor swimming pool. For the interested sub-group, the common garden with terrace, shared bike parking, shared car service and vegetable garden retain in both the top five without and with costs, indicating that this sub-group assigns less weight/importance to costs in their decision making process towards preferences. Only the hobby room is replaced for the laundry room, with consideration of costs.

Overall, it can be stated that the shared bike parking is highly preferred, appearing in every top five list; for both sub-groups, without and with consideration of costs. Moreover, the garden with terrace and vegetable garden remain popular, both appearing in three out of four top five ranking lists.

Obviously, the ranking of preferences as given in figure 4.17 is primarily based on interest. However, it should be noted that the bivariate analysis in paragraph 4.1.3 proves that interest in co-housing is, in turn, correlated with the variables gender and household composition. For instance, females show a greater level of interest in co-housing, compared to males. Moreover, singles and couples without children also show significantly more interest, as opposed to couples with children who are severely less interested. Herewith, the possibility exists that gender and household composition may indirectly have an effect on the aforementioned ranking of preferences based on interest, even though this has neither been investigated nor statistically conformed.

Theme 2: Income

For the sub-group analysis based on the variable income, sub-group 1 accounts for respondents earning 0 to 1 ½ modal salary (€0 – €60,000) and sub-group 2 consists of individuals who provide of an annual household income greater than 1½ modal salary (> €60,001).

Within the top five most preferred common facilities of both sub-groups without consideration of costs, a number of shared preferences are observable. Sub-group 1 as well as sub-group 2 rank the shared bike parking, garden with terrace and shared car service within their top five. In turn, with costs taken

into account, the number of shared preferences increases, given that the vegetable garden with greenhouse, garden with terrace, laundry room and the shared car service are in the top five lists of both sub-groups.

	Without costs		With costs	
	Top 5 sub-group 1	Top 5 – sub-group 2	Top 5 sub-group 1	Top 5 – sub-group 2
1	Shared bike parking	Shared bike parking	Vegetable garden	Vegetable garden
2	Garden with terrace	Exercise room	Garden with terrace	Shared car service
3	Hobby room / atelier	Shared car service	Laundry room	Shared bike parking
4	Vegetable garden	Garden with terrace	Hobby room / atelier	Garden with terrace
5	Shared car service	Library room w/ workplaces	Shared car service	Laundry room

Figure 4.18: Top five most preferred common facilities, for sub-group analysis on income.

With regard to preferences without and with consideration of costs for the low to middle income group, the common garden, hobby room / atelier, vegetable garden and the shared car service are not subject to price and remain in both top five lists. The exception is the shared bike parking, which is exchanged for the laundry room. Subsequently, for the higher income group it holds that the shared bike parking, shared car service and the garden with terrace continue to appear in the top five preferences, without and with costs. Although, the exercise room and library room with workplaces make place for the vegetable garden and laundry room, thereby substituting expensive common facilities for more affordable alternatives. This is somewhat remarkable, given the high income of sub-group 2.

Strikingly, with consideration of costs, differences in preferences between the two income groups are limited, since four out of five most preferred common facilities are identical; vegetable garden, garden with terrace, laundry room and the shared car service. Herewith, it appears that preferences for common facilities are independent for respondents' income.

Theme 3: Disposal of common facilities

Within the sub-group analysis regarding to whether respondents dispose of common facilities in their current housing situation or not, sub-group 1 represents the group who do not dispose of common facilitates. In turn, sub-group 2 consists of individuals who do dispose of common facilities in their current housing situation.

For the top five most preferred common facilities of sub-group 1 and sub-group 2, without costs taken into account, it holds that the shared bike parking, shared car service and garden with terrace occur in both top five lists. On the other hand, when costs are taken into account, differences between the two sub-groups reduce since the vegetable garden, shared car service, garden with terrace and shared bike parking occur in the top five most preferred common facilities of the two sub-groups.

When comparing preferences for common facilities without and with costs for sub-group 1 – individuals who do not dispose of common facilities in their current housing situation – the shared bike parking, shared car service, garden with terrace and vegetable garden appear to be limited sensitive to costs as these appear in both top five lists. Only the exercise room is replaced by the laundry room, when costs are considered. For individuals who do dispose of common facilities, the common garden with terrace

enjoys the highest preference, both without and with costs. In addition, the shared bike parking, shared car service and living room remain in the top five list. Though, the hobby room is replaced for the vegetable garden.

	Without costs		With costs	
	Top 5 sub-group 1	Top 5 – sub-group 2	Top 5 sub-group 1	Top 5 – sub-group 2
1	Shared bike parking	Garden with terrace	Vegetable garden	Garden with terrace
2	Exercise room	Shared bike parking*	Laundry room	Vegetable garden
3	Shared car service	Shared car service*	Shared car service	Shared bike parking*
4	Garden with terrace	Hobby room / atelier*	Garden with terrace	Shared car service*
5	Vegetable garden	Living room	Shared bike parking	Living room

Figure 4.19: Top five most preferred common facilities, for sub-group analysis on income.
** Significance level below 95%.*

Remarkable is that the living room appears in both top five lists (without and with costs) of sub-group 2, whereas it does not feature in both rankings of sub-group 1. Additionally, the common living room ranks at the bottom of the overall ranking list of the total sample in sub-chapter 4.2. All in all, this suggests that individuals who do dispose of common facilities in their current housing situation, are better able to assess the value of the living room, based on their personal experience.

Theme 4: Household composition

For the sub-group analysis on household composition, singles and individuals who cohabit with a partner, without children, represent sub-group 1; the sub-group without children. On the other hand, individuals who cohabit with a partner, with children, and single-parent families account for sub-group 2; individuals with children.

	Without costs		With costs	
	Top 5 sub-group 1	Top 5 – sub-group 2	Top 5 sub-group 1	Top 5 – sub-group 2
1	Shared bike parking	Exercise room	Vegetable garden	Vegetable garden
2	Garden with terrace	Shared bike parking	Garden with terrace	Outdoor swimming pool
3	Shared car service	Shared car service	Shared car service	Laundry room
4	Hobby room / atelier	Outdoor swimming pool	Shared bike parking	Exercise room
5	Vegetable garden	Hobby room / atelier	Laundry room	Shared car service

Figure 4.20: Top five most preferred common facilities, for sub-group analysis on household composition.

Within the top five most preferred common facilities of both sub-groups, several similarities are observable. Without costs and in random order, both sub-groups include the shared bike parking, shared car service and hobby room / atelier within their top five preferences. In turn, when costs are taken into account, both sub-groups rank the vegetable garden as their most preferred common facility. Also the shared car service and laundry room appear in both top five lists, with costs.

Comparing preferences without and with costs of the childless sub-group, relatively few shifts in preferences occur. The shared bike parking, garden with terrace, shared car service and vegetable garden all remain in the top five with due regard for costs. Only the hobby room / atelier makes place for the laundry room. Subsequently, for the sub-group with children, the exercise room, shared car service and outdoor swimming pool appear in both their top five lists, without and with costs considered. Nonetheless, the shared bike parking and hobby room / atelier are replaced by the vegetable garden and laundry room.

Somewhat remarkable is that the sub-group with children attaches great value on the outdoor swimming pool and exercise room, in comparison to the sub-group without children. This could potentially be explained by the fact that this sub-group attaches greater value to common facilities which also can be enjoyed by their children. Although, this has not been statistically confirmed.

Obvious, the ranking of preferences according to figure 4.20 is primarily based on household composition. Though, it should be noted that according to the bivariate analysis in paragraph 4.1.3, household composition is related to gender, age, education level and interest in co-housing. Herewith, it is possible that these variables may indirectly influence the aforementioned ranking of preferences, although this has neither been investigated nor statistically confirmed.

Theme 5: Urbanization degree living area

Within the sub-group analysis with regard to urbanization degree of respondents living area, sub-group 1 represents the group who live in a strongly urbanized living area. In turn, sub-group 2 consists of individuals who live in a moderately urbanized to not urbanized (rural) living area.

	Without costs		With costs	
	Top 5 sub-group 1	Top 5 – sub-group 2	Top 5 sub-group 1	Top 5 – sub-group 2
1	Shared bike parking	Shared bike parking	Vegetable garden	Vegetable garden
2	Garden with terrace	Exercise room	Garden with terrace	Garden with terrace
3	Shared car service	Garden with terrace	Shared car service	Shared car service
4	Hobby room / atelier	Shared car service	Shared bike parking	Laundry room
5	Vegetable garden	Hobby room / atelier	Laundry room	Shared bike parking

Figure 4.21: Top five most preferred common facilities, for sub-group analysis on urbanization degree living area.

Looking at the top five most preferred common facilities of sub-group 1 and sub-group 2 without costs considered, both sub-groups indicate a high preference for the garden with terrace, shared car service, shared bike parking and the hobby room / atelier. For preferences with costs considered, the vegetable garden, garden with terrace and shared car service represent the top three of both sub-groups. Also the shared bike parking and laundry room appear in both top five lists, wherewith the top five of both sub-groups (in random order) are identical. Herewith, it seems that – with costs considered – the urbanization degree of respondents' living environment has no influence on preferences for common facilities.

With regard to preferences of individuals residing in strongly urbanized living areas, the vegetable garden, shared bike parking, garden with terrace and shared car service occur in both top five lists, without

and with costs. Only the hobby room / atelier is replaced by a common laundry room. For respondents residing in low to moderately urbanized areas, it holds that the shared bike parking, garden with terrace and the shared car service appear in the top five preferences, without and with costs. Nonetheless, the exercise room and hobby room / atelier made place for the vegetable garden and laundry room.

Overall it can be stated that that differences in preferences between urban dwellers and individuals residing in low to moderately urbanized areas, are (very) limited, which is somewhat remarkable. Moreover, it is striking that urban dwellers attach great importance on more 'rural; facilities; as the vegetable garden and garden with terrace occur in the top two, taking costs into account.

4.4. CONCLUSION

In the context of this chapter, the response on the questionnaire and sample characteristics have been discussed. Regarding the sample description, this has been compared to the overall population – individuals aged between 50 and 80 years old – wherever possible. Based on the sample characteristics it can be concluded that these deviate significantly from the overall population. Only household composition aligned with the population. All the other characteristics showed discrepancies. Regarding the sample characteristics, various bivariate analyses have been conducted to conform or deny empirical relationships between two variables.

Subsequently, based on the completed surveys and the analysis of this data, the overall preferences for common facilities have been derived. In this process, a model has been estimated for preferences for common facilities without consideration of costs, and a model for preferences for common facilities with consideration of the associated costs. The results indicate that the associated costs of common facilities have an influence on preferences. With consideration of costs, various shifts are observable since some common facilities climb the ranking while others decrease in preference. Although, three common facilities are in particular noteworthy, namely the shared bike parking, garden with terrace and the shared car service. These three facilities appear in the top five of both models – without and with costs – herewith forming a common denominator. In addition, with costs taken into account, also the vegetable garden and the laundry room exhibit a high preference.

In addition to the analysis regarding preferences for common facilities on the total sample, preferences within subgroups also have been researched, to provide answers regarding sub-question 3. These subgroup analyses have been conducted on five themes; interest in co-housing, income, disposal of common facilities in the current housing situation, household composition and the urbanization degree of the current living area. From these analyses it was found that – with consideration of costs – there are several themes where preferences between the two subgroups hardly differ, namely income, disposal of common facilities in the current housing situation and urbanization degree of living area. These personal characteristics thus have little to no influence on preferences for common facilities. On the other hand, for the themes interest in co-housing and household composition, preferences between the two sub-groups were further apart, indicating that these personal characteristics do influence preferences for common facilities.

5. CONCLUSIONS AND RECOMMENDATIONS

To conclude this research, this chapter will discuss the conclusions, discussion and reflection, and recommendations. Sub-chapter 5.1 pertains to the overall conclusion in which the main research question will be answered, based on the research results. Subsequently, sub-chapter 5.2 addresses the discussion and a reflection on this research and the research process. Then, sub-chapter 5.3 provides recommendations for interpreting and implementing the findings of this study, and further research directions.

5.1. CONCLUSIONS

The main research question which stands central within this research, concerns what common facilities within co-housing projects are preferred among elderly, and what factors influence these preferences. These preferences were investigated through an evaluation by ranking experiment, after which a rank-ordered logit model was applied for the analysis. Thereby, preferences for common facilities were examined both without and with consideration of their associated costs. Making this distinction is of interest for identifying differences in preferences, although it is essential – or even inevitable – to ultimately consider the costs of common facilities, since these will always be necessary for the realization of these facilities.

The results of the study indicate that three common facilities are in particular of importance, namely the shared bike parking, common garden with terrace and the shared car service. These three facilities recur in the top five most preferred common facilities, both without and with consideration of costs, forming a common denominator (see table 13). Subsequently, with costs taken into account, also the vegetable garden and laundry room exhibit a high preference among (future) elderly.

Table 13: Top five most preferred common facilities, without and with consideration of costs.

Rank	Top 5 without costs	Top 5 with costs
1	Shared bike parking	Vegetable garden with greenhouse
2	Garden with terrace	Garden with terrace
3	Exercise room with sport equipment	Shared car service
4	Shared car service	Laundry room
5	Hobby room / atelier	Shared bike parking

In addition, the results indicate that the associated costs of the common facilities have an influence on (the ranking of) preferences. Besides a number of stable common facilities, various shifts are observable with costs considered. The more affordable common facilities – vegetable garden with greenhouse and laundry room – show a significant increase in popularity, with costs considered. In turn, the more expensive exercise room experiences a sharp decline. This implicates that individuals are (to some extent) sensible to more affordable alternatives. On the other hand, the shared bike parking, garden with terrace and the shared car service concern relatively expensive common facilities that are not subject to price since these retain stable, indicating the high preference for these facilities. Herewith, it can be concluded that individuals do not necessarily give the highest preferences to the most affordable alternatives.

In addition to the evaluation by ranking experiment, respondents were also asked about several personal characteristics. On this basis, sub-group analysis have been conducted regarding five themes: inter-

est in co-housing, income, disposal of common facilities in the current housing situation, household composition and the urbanization degree of the current living area. The outcomes of these sub-group analyses indicate that – with consideration of costs – there are serval themes / personal characteristics where preferences between the two subgroups hardly differ, namely income, disposal of common facilities in the current housing situation and urbanization degree of the living area. These personal characteristics thus have limited to no influence on preferences for common facilities. On the other hand, for interest in co-housing and household composition, preferences between the sub-groups were further apart, indicating that these characteristics do influence preferences for common facilities. Through these findings the possibility arises to differentiate co-housing projects based on these characteristics, thereby aligning those projects better on preferences for common facilities of these sub-groups.

5.2. DISCUSSION AND REFLECTION

To start, a number of preferences derived from this study will be compared to the present common facilities found within the analyzed reference projects, due to limited literature. In the first place, it is remarkable that the common living room and kitchen with dining area are placed at bottom while these form one of the most prevalent common facilities within existing co-housing projects. Specifically, among the examined reference projects 78% features a common living room and 75% is foreseen of a shared kitchen with dining room. Herewith, the findings do not align with the practical examples of the analyzed reference projects. An explanation for the low preference for the living room may be that individuals perceive a living room as a private space and are not able to understand and appreciate the functionality of this common facility.

Besides the common living room and kitchen with dining area, the exercise room also indicates a relatively low preference within this study. This is consistent with the characteristics of the reference projects where only 16% features an exercise facility. Though, the research of Hennink (2018) on the transformation of vacant office buildings to senior dwellings indicates that (future) elderly value an outdoor gym as attractive and added value. This discrepancy may results from a price differential between an indoor and outdoor exercise facility. Within this study, the exercise room was highly preferred without consideration of costs. However, with costs taken into account this facility experienced a sharp decline, possibly due to the relatively high costs. It is conceivable that an outdoor gym is considerably less expensive and herewith, valued differently.

On the other hand, it is noticeable that the shared car service enjoys a very high preference (rank three) within this study, while this facility occurs only to a limited extent in practice. Among the examined reference projects only 25% features a shared mobility concept. Also here a gap between the findings of this study and the characteristics of the reference projects exists. This discrepancy can possibly be explained by the fact that the reference projects are developed several years ago, whereas shared mobility remains a new concept, particularly popular among individuals up to the age of fifty years (Jorritsma et al., 2021). Moreover, despite the fact that the shared car service concerns one of the more expensive common facilities, it enjoys a high preference. It is highly probable that this can be explained by respondents associating these costs with the corresponding benefits, wherein a shared car for the community is much more affordable than a private car (Nibud, 2023).

Furthermore, the laundry room appears to be a preferred common facility, ranking at the fourth place with consideration of costs. However, this facility is relatively scarce among the analyzed reference projects, since it is only present in 34% of the cases. In addition, Felix (2019) found in his study on residen-

tial preferences of elderly towards co-housing that elderly assign a negative value to a shared laundry facility within a co-housing project, and highly prefer a private washing facility. Again, there appears to be a discrepancy between the findings of this study, practical examples and the results of another study.

Subsequently, looking at the results of the sub-group analyses, it is considered as remarkable that differences in preferences between lower and higher income groups are very limited, while is it generally known that higher income groups have a higher willingness to pay (Baumgärtner et al., 2017). The sub-group analysis indicates that four out of five most preferred common facilities overlap between the two income groups (with consideration of costs) while it was expected that preferences would diverge further. Additionally, it was expected that higher income groups would indicate stronger preferences for more luxurious and more expensive common facilities, since they have more disposable income to afford such facilities.

The results of the sub-group analysis on whether respondents dispose of common facilities in their current housing situation or not, are somewhat remarkable too. Of the group who do dispose of common facilities, it was expected that these individuals would indicate a strong preference towards a common living room and kitchen with dining room. These facilities are namely the number two and three most prevalent common facilities within existing co-housing projects. Though, for the respondents who do dispose of common facilities, the living room only ranks at place five and the kitchen indicates even a negative value (not significant) for this specific sub-group. Strikingly, the preferences for common facilities of this sub-group do not align with the practical examples, despite the fact that this group specifically resides in existing co-housing projects.

In addition to the product based reflection, also a reflection on the process is provided. First, regarding the ranking experiments, the fifteen common facilities were to each respondent presented in alphabetical order. The question arises whether presenting these facilities in random order – which would also differ per respondent – would result in different ranking/preference outcomes. For example, the common living room (in Dutch 'woonkamer') was placed at bottom in the presentation of facilities. In turn, the question arises whether this unconsciously leads respondents to perceive this facility as less attractive.

Second, in establishing the monthly costs of the common facilities per households, several assumptions have been made, warranting some remarks. Initially, the monthly costs are based on the initial investment costs, whereby the exploitation costs have not been taken into account. It is notable that certain common facilities may be relatively inexpensive to realize but are costly to operate. An example is the swimming pool, which generally requires significant energy expenses. Moreover, the initial investment costs of certain common facilities also include budget for furniture, with the monthly costs based on a mortgage of 30 years. Although, furniture typically does not have a lifespan of 30 years, resulting in an accelerated depreciation and higher monthly costs (Consumentenbond, 2017). To finish, the costs per facility per household have been calculated based on the assumption of a fictive co-housing project, consisting of 25 housing units, which is considered as most suitable (McCamant & Durrett, 2011). However, co-housing projects can vary in size, which in turn affects the monthly contribution; more dwellings result in relatively cheaper common facilities, and vice versa.

Furthermore, within this experiment, preferences for common facilities were investigated per respondent through an individual ranking experiment. However, in practice, co-housing projects are typically developed through a collective and iterative process whereby future residents collectively consider

which common facilities they desire, how they intend to utilize them, their preferred dimensions and areas (McCamant & Durrett, 2011). Through this process, an individual's initial preferences may be revised as the group process influences these personal insights via multiple perspectives and discussions. Such a group decision making process could potentially influence the preferences for common facilities with-in co-housing projects.

Lastly, in addition to the results of the total sample, sub-group analyses have been conducted on five themes in order to further elucidate preferences. This can be considered as a bivariate approach, where preferences are corrected for a specific theme/characteristic. However, the analysis could be further enhanced/optimized by employing a multivariate analysis, including interaction effects which can provide further insight into other variables that affect the correlation between a dependent and independent variable.

5.3. RECOMMENDATIONS

Within this sub-chapter, first recommendations for practice will be discussed. For the development of new co-housing projects targeting individuals aged 50 years and older – both privately and commercially initiated – it is recommended to include at least shared bike parking, common garden with terrace and shared car service. This with the underlying motivation that these common facilities experience a high preference both without and with costs considered. Additionally, the inclusion of a vegetable garden with greenhouse and laundry room is recommended as well, since these facilities also constitute part of the five most preferred common facilities, with consideration of costs. Through this composition of facilities, the preferences of the intended target group are maximally met.

Subsequently, the results of the sub-group analysis regarding interest in co-housing are relevant, since individuals who are interested in co-housing might be likely to actual move to a co-housing project. On the other hand, through the implementation of preferences of the group who is not interested or have not formed a clear opinion (yet), these individuals may nevertheless be persuaded to this socially sustainable housing concept. Therefore, it is recommended to at least implement the overlapping common facilities of both sub-groups; vegetable garden with greenhouse, shared bike parking and the laundry room. The risk of realizing specific facilities for the undecided subgroup who may withdraw, is thereby eliminated. Moreover, these common facilities are also in line with the most preferred facilities of the total sample.

Subsequently, if it is possible to gain insight into the household profiles of future residents in advance, or if the co-housing project is specifically intended for a specific household profile (households without or with children), this results in different preferences for common facilities, which can be taken into account in the decision-making process. For co-housing projects targeted at households with children, it is recommended to realize at least a vegetable garden, outdoor swimming pool and a laundry room. On the other hand, in the case an 'adults only' co-housing project, the vegetable garden, garden with terrace and shared car service are advised. Though, when the objective is to bring various household compositions together within one co-housing project, it is recommended to implement the overlapping common facilities – vegetable garden, shared car service and laundry room – which, in turn, are in line with the overall preferences.

The sub-group analysis on respondents' income revealed that differences in preferences for common facilities between higher and lower income groups are limited. Since income has minimal influence on

preferences for common facilities, it is strongly recommended to realize and develop co-housing projects with residential units in various price segments: larger and more expensive housing units for higher income groups, and smaller, more affordable dwellings for lower incomes. This allows to realize a greater level of diversification, and to reside a wide range of income groups together within the same co-housing project utilizing the same common facilities, fostering a more inclusive, diverse and socially desirable housing project.

One of the common facilities that merged as highly preferred both within the total sample and across the various subgroups, is the shared car service. Although, since this facility is uncommon among existing co-housing projects and can easily be implemented afterwards, it is highly recommended for existing co-housing projects to implement this facility nonetheless. This may encourages individuals to relinquish their private car(s), resulting in more efficient and sustainable car usage, lower car ownership, fewer required parking spaces which, in turn, could provide space for additional vegetation. Moreover, reducing car ownership and creating car free environments is in line with various national policy documents (Jorritsma et al., 2023).

Based on this research, additional research can be conducted on several themes/subjects. Beyond the analysis of preferences for common facilities of the total sample, preferences of sub-groups based on five themes have been examined as well, aiming to elucidate differences in preferences among these groups. Firstly, these insights could be expanded by conducting this analysis on other themes too, such as gender, education level and someone's housing type. In addition, regarding age, besides respondents of 50 years and older, the dataset also includes respondents of 49 years and younger. Within this study, these respondents were treated as 'future' elderly. Future analyses can make clear if this group is indeed similar to the group of 50 to 65 years, or whether they report different preferences.

Subsequently, a further deepening of preferences could be realized through the application of 'resident profiles'. Rather than dividing the total sample into sub-groups based on a particular theme, resident profiles can be created by a combination of personal characteristics. For example, this approach would provide an understanding of preferences for common facilities, of an individual who is interested in co-housing, lives together with a partner and without children, and identifies as female. Through the analysis of various combinations a decision three could be created, from which the preferences for common facilities per 'resident profile' can be derived. Additionally, another recommended method to further deepen preferences is the application of a multivariate analysis, as discussed in the previous sub-chapter.

All in all, valuable insights have been generated by this research, on how common facilities within co-housing projects are preferred among elderly, and how these preferences are influenced by personal characteristics and the associated costs of these facilities. The outcomes provide useful and practical insights for the development and implementation of common facilities in new co-housing projects.

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APPENDICES

A – ANALYZED CO-HOUSING PROJECTS

To gain more insight in the most prevalent common facilities within elderly co-housing projects, existing co-housing projects – specially developed for or with dedicated space for seniors – have been analyzed. The examined projects are located in Denmark, the Netherlands, Belgium and Germany, and for each country seven co-housing projects were considered.

Nr. 1.1 – Denmark – Sønderborg Bofaellesskab

Community, active recreation and sustainability are the characteristics of the senior co-housing project Sønderborg Bofaellesskab, located in Sønderborg, Denmark. The project is aimed at people with an age of 50 years and older, and when the initiative was announced by the project developer, great interest was immediately shown. Sønderborg Bofaellesskab is located at the waterfront, provides a spectacular view towards the sea and houses 44 apartments in total. Various common facilities – such as an exercise room, kitchen and a library – are included, which should provide an attractive package for an enjoyable, comfortable and inspiring senior life (PFA, 2021; Daugaard Pedersen, 2022).

Figure A1: Sønderborg Bofaellesskab (Sønderborg Bofaellesskab, n.d.).

Nr. 1.2 – Denmark – Kamelia Hus

In Copenhagen, the capital of Denmark, a senior co-housing project has been developed, called Kamelia Hus. The co-housing project was initiated by a commercial project developer and consists of 49 rental apartments with living areas varying between 44 and 71 m2. The project targets at active and independent elderly who attach great value to social contacts, greenery and an urban living environment with all its associated facilities. On each floor in the heart of the apartment building, communal rooms are situated where residents can recreate and undertake social activities together. Herewith, the architect states that the communal philosophy is embodied in the design and layout of the building (Andersen & Stousrup, 2019; Groenttorvet, 2023).

Figure A2: Kamelia Hus (Groenttorvet, 2023).

Figure A3: Residents of Kamelia Hus in rooftop greenhouse (Bofaellesskab, n.d.).

Nr. 1.3 – Denmark – Balancen

Balancen is a Danish housing community for people aged above fifty years, who want to live in a nature inclusive, sustainable and social environment. Essential communal values are enjoying life together, look after each other and experience nature. The project consists of 33 outward-facing houses, with the principle of less private square meters and – in turn – more communal facilities (approximately 300 m2). The dwellings are clustered like a small village and as sustainability is an essential pillar, wood is used as main construction material. Moreover, in Balancen sustainability is also related to the community; sharing spaces and things and taking care of each other and nature (Hessellund, 2020).

Figure A4: Balancen (Pension Danmark, n.d. -b).

Nr. 1.4 – Denmark – Fremtidens Seniorbofaellesskab

Fremtidens Seniorbofaellesskab (in English senior co-housing community of the future) is a small scale elderly co-housing project, located in Denmark. Like Balancen, nature plays an essential role within this co-housing project, as the complex is located within a rich natural landscape. The project is targeted at active seniors and pursues the goal to strengthen social bonds between residents, to create an inclusive living environment where the residents experience a high level of social cohesion ad are there for each other. In total, 14 apartments are included, divided into three residential buildings situated around a small central green heart. The various common facilities are also spread over the three buildings with the aim to increase the 'importance' of the green central heart (Hessellund, 2020; Nygaard, 2020).

Figure A5: Fremtidens Seniorbofaellesskab (Nygaard, 2020).

Nr. 1.5 – Denmark – Gartnerbyen

A co-housing project located within the city but in close proximity to the nature, is Gartnerbyen, located in the city of Odense, Denmark. The housing project counts 86 dwellings, with living areas varying from 86 to 95 m2. A strict requirement for admission to the project is a minimum age of 55 years, and the fact that the children have left the house. To facilitate social cohesion and a community feeling, various shared facilities are included in Gartnerbyen. At the heart of the building block, the community house is located which is fitted with a shared kitchen, dining and living area. Furthermore, at the roof a greenhouse and orangery are situated, which provide a panoramic view over the skyline of Odense. Finally, a distinctive service Gartnerbyen offers is the host/housekeeper, who helps the residents with managing the communal areas, small repairs, and organizes activities (PFA, n.d.).

Figure A6: Gartnerbyen (Gartnerbyen, 2022).

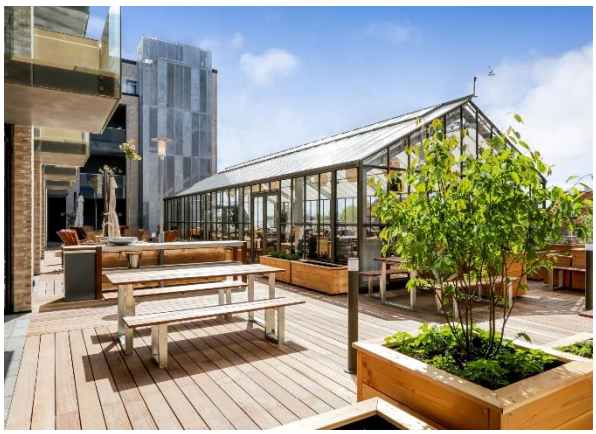

Figure A7: Rooftop greenhouse and orangery at Gartnerbyen (Gartnerbyen, 2022).

Nr. 1.6 – Denmark – Ibihaven

In Slagelse, Denmark, elderly co-housing project Ibihaven has recently been realized. The project is described as modern housing community with sustainable rental units, suitable for people of fifty years and older whereby the children have left the house. Ibihaven exists of 76 lifetime compatible and future proof dwellings, with living areas varying between 53 and 79 m2, clustered around an indoor courtyard of 1500 m2 where various common functions are located. The supporting structure of the roofed courtyard is completely made of wood which creates a sustainable and special atmosphere, in combination with the intensive green which is present (Astbury, 2021; Agorahaverne, n.d.).

Figure A8: Indoor courtyard at Ibihaven (Agorahaverne, n.d.).

Figure A9: Indoor vegetable garden at Ibihaven (Agorahaverne, n.d.).

Nr. 1.7 – Denmark – Broen

At the coast of the Baltic Sea, co-housing project Broen is located. For this residential building the emphasis is on a community feeling and enjoying nature. The apartment complex suits 28 units, all destined for seniors aged above fifty years. Within Broen, residents belong to a community where they meet and interact with each other, which makes daily life more easy and fun. Besides the individual self-catering apartments, shared spaces are included such as a central kitchen with dining area where the residents eat together on a weekly basis. During the design phase, the residents already got involved so that they could think along in the design of their apartment and the common areas. The architectural style can be described as Scandinavian, warm and modern (Vandkunsten Architects, 2020).

Figure A10: Residents of Broen having dinner together (Pension Danmark, n.d. -a).

Figure A11: Broen with its central garden (Byggeri, 2020).

Nr. 1.8 – Denmark – Den Rode Trad

Den Roden Trad, a Danish multigeneration co-housing project, commits to private dwellings, accompanied by a number of shared areas to stimulate interaction between residents. The age categories which are represented vary from young adults between 18 and 30 years old, to seniors aged above 70 years. Within this housing community, everyone's privacy and autonomy is respected, although on the other hand it is expected that residents contribute to the community with its social aspects. The project is located at the edge of Roskilde, wherewith residents have access to all urban amenities. Within Den Rode Trad, 24 dwellings are specially designed for elderly, whereby the requirement holds that these occupants are aged above 50 years and have no children living at home (Bofaelleskab, 2022; KAB, n.d.).

Figure A12: Den Rode Trad (Bofaellesskab, n.d.).

Nr. 2.1 – Netherlands – Knarrenhof

A well-known and strongly marketed elderly co-housing concept within the Netherlands, is Knarrenhof, developed by the Knarrenhof Foundation. This organization has realized various projects and more are to come. A Knarrenhof project contains between twenty and fifty individual dwellings and is characterized by a residential courtyard layout. The Knarrenhof concept is aimed at independent living and ageing, whereby residents mutually support each other. Concerning the dwellings, each house operates stand-alone to ensure privacy and autonomy. However, all houses are situated within a collective setting/context. A common garden within the center of the courtyard forms the basic principle. Furthermore, other common facilities are included, depending on the project (Knarrenhof, 2023; Witter, 2019).

Figure A13: Knarrenhof and its central shared garden (Knarrenhof, 2023).

Nr. 2.2 – Netherlands – De Schrijver

The housing project “De Schrijver”, located in Eindhoven, the Netherlands, is a CPC co-housing project initiated by a group of households. The project was realized under supervision of KilimanjaroWonen; a Dutch organization specialized in the management and development of CPC projects, with the particular focus on CPC co-housing projects for elderly. From the start of the development process, the future residents got involved in the design process, so that they could convey their wishes and demands. The plan is characterized by a prewar school building and additional new realized residential buildings, situated in an enclosed layout with in the center a shared garden. At the request of the residents, other common functions are also included, such as a shared living room, gym, hobby area, laundry room, a guest room, bicycle shed and an underground car parking garage (KilimanjaroWonen, n.d. -a).

Figure A14: De Schrijver (KilimanjaroWonen, n.d. -a).

Figure A15: Hobby room at De Schrijver (KilimanjaroWonen, n.d. -a).

Nr. 2.3 – Netherlands – Cohousing Arnhem

Cohousing Arnhem is a co-housing project, initiated by a group of private individuals, wherewith this is a so called CPC project. Under supervision of an architect and CPC management firm, plans have been developed to realize the apartment building. Besides the 32 stand-alone apartments, various common facilities have been realized to stimulate the social and collective values of the CPC group. As the project was initiated by its future residents, they had maximum freedom to design the building and apartments according to their own personal wishes and demands (Cohousing Arnhem, 2021b).

Figure A16: Cohousing Arnhem (Cohousing Arnhem, 2021b).

Nr. 2.4 – Netherlands – Stadsveteraan

Independent living, but together with others, is what co-housing project Stadsveteraan conveys. Within the project, 91 stand-alone apartments are included which dispose of their own living room, kitchen, bed and bathroom. What makes this project unique, is that also 23 'friends apartments' are included. These apartments are suitable for two or three individuals who dispose of their own bed and bathroom, but who share the kitchen, living room and balcony. Besides the friends apartments, the collective philosophy is also reflected in other shared function on building level, such as a cooking studio and a library. To finish, Stadsveteraan aims at residents from sixty years and older (AM, 2023).

Figure A17: Stadsveteraan (Stadsveteraan, 2023).

Nr. 2.5 – Netherlands – Nevel Nemas

A Dutch co-housing project specifically targeted at elderly, is Nevel Nemas, located in the city of Delft. The residential community consists of 34 rental apartments with a living area of approximately 100 m2, and which are all lifetime compatible. Within the heart of the apartment complex, communal spaces are present where residents can meet each other. Also, activities are organized here on a weekly basis such as cooking, playing billiards or game nights. The residents are all aged between fifty and ninety years and are all self-reliant. Nevertheless, caring for- and helping each other is a basic principle within Nevel Nemas. The residents believe that sooner or later going to a retirement home is inevitable, but that such housing concepts strongly contributes in delaying this (Nevel Nemas, 2017).

Figure A18: Communal room at Nevel Nemas (CWD, 2023).

Figure A19: Nevel Nemas (ABB Bouwkracht, n.d.).

Nr. 2.6 – Netherlands – Parkentree

For people aged above fifty years who are searching for socialization, freedom and a pleasant living environment, Parkentree offers a solution. This co-housing project has been realized by a project developer, in co-creation with its (future) residents. The initiator describes this project as the perfect housing opportunity for elderly whereby the kids have left the house, and who are ready to enjoy a social and comfortable life. In order to create a lively, sustainable and interesting community, the project consists of a diverse housing program; two-room-, three-room-, four-room apartments, penthouses and patio dwellings are all included in different price categories. The project counts 89 dwellings in total, all situated around two shared gardens (INBO, 2020; Blauwhoed, 2020).

Figure A20: Parkentree with one of its common green area's (INBO, 2020).

Nr. 2.7 – Netherlands – De Lindehoeve

In the center of Tilburg, an old farming house has remained intact. A group of private individuals saw this as the perfect place to realize their dream; develop a co-housing project together where they can live independently together. The ancient farm shed has been maintained, renovated and transformed to communal spaces, namely a shared living room, guest house and a laundry room. The housing project counts ten dwellings situated around the central courtyard, which creates an intimate and enclosed living environment (KilimanjaroWonen, n.d. -b).

Figure A21: De Lindehoeve (KilimanjaroWonen, n.d. -b).

Figure A22: De Lindehoeve (KilimanjaroWonen, n.d. -

Nr. 2.8 – Netherlands – Buurtschap De Gast

Independent living within a collective, social and natural context is where Buurtschap De Gast aims at. This collective housing plan was initiated by a group of private individuals and managed by an accompanying party, wherewith this considers a CPC project. This multi-generation project, with an emphasis on elderly, consists of 9 ground bounded houses and 6 apartments, situated around a green courtyard. At the heart of this courtyard, a communal garden is located, even as a shed with various shared facilities such as a living room, guest house and bike storage. With these common facilities, Buurtschap De Gast aims at creating an active and social living environment (Buurtschap De Gast, 2023).

Figure A23: Buurtschap De Gast (Pandomo Makelaars, 2023).

Nr. 3.1 – Belgium – Qville

A recently developed co-housing project in Essen, Belgium, is Qville. The housing project tends to be a multigeneration co-housing project, but with a large emphasis on elderly. Within the project there is a strong focus on the collective philosophy, but not as obligation. The developer states that collective housing is the way of living of the future, with all its advantages including a high level of social cohesion, a high quality of life, the ability to keep an eye on each other and helping one another, and more amenities and facilities. The housing project consists of 43 energy neutral dwellings and also kangaroo houses are included. The co-housing philosophy is facilitated by various shared facilities, among which a swimming pond, orchard and an indoor swimming pool (Heem, n.d. -b; Njiokiktjinen, 2021).

Figure A24: Qville (Heem, n.d. -b).

Figure A25: Qville with its shared swimming pond (Heem, n.d. -b).

Nr. 3.2 – Belgium – Negenhoek

Like Qville, co-housing project Negenhoek – located in Kortenhoek, Belgium – is also a multigeneration housing project, with space for elderly. The plan includes twelve houses and twenty apartments, divided into several building blocks which are playful distributed over the green plan area. Also here it holds that there are various common facilities such as a laundry room, kitchen, dining area and shared electric cars. The developer states that besides spaces also stuff can be shared such as tools or a barbeque. Within Negenhoek sharing spaces and seeking for social contact are stimulated and facilitated but happens on a voluntary basis and by means of personal demand (Cohousing Projects, n.d. -a).

Figure A26: Negenhoek with its central common garden (Cohousing Projects, n.d. -a).

Nr. 3.3 – Belgium – Villa de Proost

For elderly who prefer a small-scale and luxurious co-housing project in Belgium, Villa de Proost offers a proper solution. The residents of the Villa are all aged between 85 and 95 years and enjoy each other's company on a daily basis in the shared living room and dining room with kitchen. Furthermore, each resident or couple has their own spacious bedroom – including a private bathroom. Herewith, all residents spend the majority of their time in the communal areas on the ground floor. The residents eat on a daily basis together and activities are organized with regularity; from living room concerts to a trip to the museum. Furthermore, the villa features assisted living services so that residents can live as long as possible independently (Villa de Proost, n.d.).

Figure A27: Villa de Proost (Neesen, 2020).

Figure A28: Common garden of Villa de Proost (Van de Velde, 2021).

Nr. 3.4 – Belgium – De Notenkraker

In the historic city center of Leuven, Belgum, co-housing project De Notenkraker can be found. The project has been developed by Abbeyfield, a project developer specialized in senior co-housing projects. The apartment building counts thirteen self-contained dwellings, included with a private balcony/terrace. According to the developer, senior co-housing projects contribute to ageing in place as elderly can mutually support each other, wherewith they can maintain an independent lifestyle. When a dwelling becomes available again, the residents state that they steer on an age mix to prevent the housing project does not evaluate to a group with only the very elderly (Develtere, 2021; Abbeyfield, 2023).

Figure A29: De Notenkraker (Samenhuizen, n.d.).

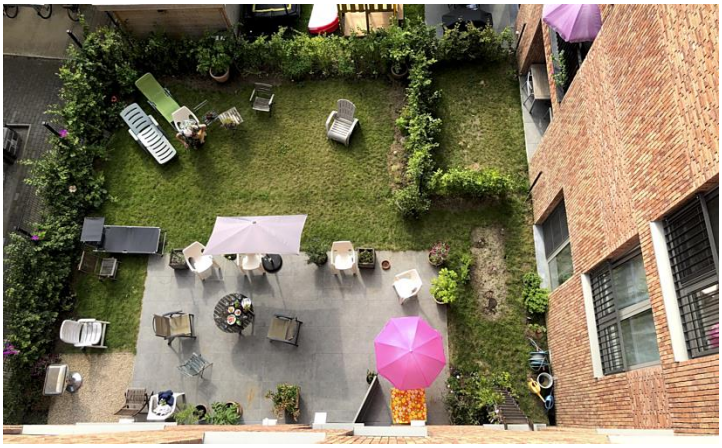

Figure A30: Common garden of De Notenkraker (Abbeyfield, 2023).

Nr. 3.5 – Belgium – Wijg & Co

“Living apart together” is the quote Wijg & Co identifies itself with. This modern, ecologic multi-generation co-housing project contains 33 houses and apartments, suitable for younger families and elderly (couples). Wijg & Co follows three pillars; living together with respect for each other, accessibility and ecology. The play lay-out is characterized by playful and intensive green areas, which are car free. All in all this results in an unwinding and natural atmosphere. Besides the individual dwellings, various common facilities are included among which a kitchen with dining area, co-working spaces, guest rooms and an (art)studio (Cohousing Projects, n.d. -c).

Figure A31: Shared outdoor space and pavilion of Wijg & Co (CG Concepts, 2020).

Nr. 3.6 – Belgium – Kadans

Nearby Antwerpen, situated along the Albert canal, co-housing project Kadans is located. An eye-catching building within the project is the ancient farmhouse, dating from 1842, which has been transformed to eight houses. The additional new realized houses are foreseen of a natural and sustainable character by use of wooden facades. To foresee in lifetime compatibility, various houses are ground floor. Besides the individual dwellings, numerous shared facilities are included such as an outdoor swimming pool, a sauna, guest room and communal living room. The residents state they organize activities together on a regular basis and that they meet each other often spontaneously, which is perceived as meaningful and valuable (Heem, n.d. -a; Auman, 2023).

Figure A32: Kadans (Heem, n.d. -a).

Figure A33: Private terrace, adjacent to shared garden (Heem, n.d. -a).

Nr. 3.7 – Belgium – 't Getouw

A small scale co-housing project for people aged above 55 years is 't Getouw, located in Belgium. Each apartment is comfortable and practically designed, but relatively compact with only one bedroom. This with the philosophy that the main focus is on the various common amenities such as a living room, kitchen and outdoor terrace where the residents can meat and interact with each other. The apartments are designed in a way they are lifetime compatible so that the residents can age here in place. Growing old with each other is the purpose of this co-housing project (Provincie Antwerpen, 2023).

Figure A34: Communal kitchen of 't Getouw (Matthyssen, 2023).

Figure A35: Shared garden at 't Getouw (AIDarchitecten, n.d.).

Nr. 3.8 – Belgium – Maison Biloba

Located in Brussels, the multicultural co-housing project Maison Biloba is situated. This housing community describes itself as a lively and careful housing/living environment, specially designed for and by elderly. One of the core values is independence, wherewith the senior community focusses on staying active and autonomous. Another important pillar for the group is to counteract social isolation. The co-housing project is located in a lively neighborhood and so the residents focus on interacting with the residents/neighbors around them, from various age categories. In total, Maison Biloba counts fifteen apartments, each with their own bathroom and kitchen. Additionally, the residents share a number of common facilities, centered around the courtyard (Maison Biloba, 2021).

Figure A36: Courtyard Maison Biloba (Samenhuizen, 2023).

Figure A37: Residents Maison Biloba (Samenhuizen, 2023).

Nr. 4.1 – Germany – Amaryllis

Amaryllis concerns a multigeneration co-housing project in Germany, consisting of thirty apartments, where the residents vary from single parents, families with children to elderly (couples). The connecting factor is the fact that all residents pay high importance to a sustainable, eco-friendly, inclusive and solidary way of life. The social cohesion level within Amaryllis is high, as respondents do activities together on a regular basis; eating together, gardening, and help and be there for each other. The project consists of thirty apartments, located in three building blocks, whereby ten apartments are specially designed for elderly. The included common facilities vary from a shared living room, to a kitchen, garden, guest room, hobby spaces and a shared car. The layout of the co-housing project is 'open' so that interaction with surrounding neighbors is stimulated. Furthermore, surrounding residents are free to use the common facilities within Amaryllis (Ache & Fedrowitz, 2012; Amaryllis, n.d.).

Figure A38: Amaryllis (Amaryllis, n.d.).

Nr. 4.2 – Germany – Andreasgärten

Andreasgärten is a multigeneration co-housing project in Erfurt, Germany, whereby also lifetime compatible dwellings are included, specially dedicated for elderly. The project consists of 89 apartments in total, spread across three buildings arranged around a communal garden. Within Andreasgärten, assisted living for elderly is included so that they can continue their normal, independent life and are part of the community for as long as possible. Various shared facilities are included, among which a private bookable therapy room. The galleries from the apartment buildings are foreseen of small private verandas which contributes to social cohesion and a lively living environment, wherewith these form a vital role within the architectural design (Peacock, 2023).

Figure A39: Central garden of Andreasgärten (Peacock, 2023).

Figure A40: Galleries with verandas (Peacock, 2023).

Nr. 4.3 – Germany – Willda Wohnen

The housing project Willda Wohnen is a senior CPC co-housing project in Wien, as an answer – according to its founders – to Wien's high rents, anonymous housing environments and a lack of qualitative housing. The community describe themselves as appreciative, inclusive and open minded for improvements, and states that they boost their quality of life by sharing and living with each other. The housing project contains 25 dwellings, distributed around four buildings which are realized around a courtyard. To achieve and convey their communal values, numerous shared facilities are included such as a kitchen with dining area, a sauna, library, vegetable garden, laundry room and co-working spaces (Willda Whonen, n.d.).

Figure A41: Willda Wohnen (Willda Wohnen, n.d.).

Figure A42: Shared kitchen and dining area at Willda Wohnen (Willda Wohnen, n.d.).

Nr. 4.4 – Germany – Zeppelinhof

Growing old together without being lonely, is the motto of elderly CPC co-housing project Zeppelinhof. The project is part of a larger area development, located in a peaceful neighborhood close to the city center of Neuwied. Creating affordable housing, without compromising the quality of living, is of paramount importance for the community. In total, 14 apartments are realized, accompanied by a shared living room, library and communal garden. The dwellings are relatively compact, in the context of the shared facilities (Lutterberger, 2021).

Figure A43: Residents of Zeppelinhof (Lutterberger, 2021).

Figure A44: Zeppelinhof with its communal garden (Lutterberger, 2021).

Nr. 4.5 – Germany – Fischbeker Höfe

Surrounded by nature and forest but close to the urban environment of Hamburg, Fischbeker Höfe is located. This luxurious elderly co-housing project is suitable for those who care about their own private dwelling, but value a communal living environment with a high level of social cohesion. Each apartment is foreseen of a kitchen and bathroom so that it is self-sufficient. However, various shared facilities are included which provide opportunities for all kinds of lifestyles; from social activities to more active activities. With respect to the apartments, these vary from 24 to ninety square meters and are all luxurious finished. Subsequently, the luxurious atmosphere is ratified by a 24 hour concierge service (Fischbeker Höfe, 2023).

Figure A45: Fischbeker Höfe (Fischbeker Höfe, 2023).

Nr. 4.6 – Germany – Buch am Erlbach-project

A healthy mix of different generations is the essential pillar in developing a sustainable and self-reliant community on the long term, whereby people help and support each other. This is the vision of a German housing association, who has developed the multigeneration Buch am Erlbach-project. Within the project both houses and apartments are included, distributed over various building blocks. The apartments are lifetime compatible and herewith targeted at seniors. The architect states that by creating a multigeneration co-housing project, elderly remain part of a community instead of getting isolated. In total, 26 dwellings are part of the project, each with its own balcony situated towards the central courtyard, to create and stimulate social interaction and neighbor contact (MARO, 2023).

Figure A46: Buch am Erlbach-project with its central courtyard (MARO, 2023).

Figure A47: Buch am Erlbach-project (MARO, 2023).

Nr. 4.7 – Germany – Mehrgenerationenhäuser Weyarn

Embedded in a park-like setting, co-housing project Mehrgenerationenhäuser Weyarn is located. This housing project consists of seven building blocks which include ten dwellings each. Distinctive for this plan is its green context, resulting in a natural and healthy living environment. Moreover, this shared greenspace provides opportunities for residents for social interaction and recreational activities. The purpose of Mehrgenerationenhäuser Weyarn is to create a sustainable housing community where residents can meet and talk to each other, provide mutual help, work together and support each other in personal development. The project has been developed in co-creation with its future residents and people living near. Workshops have been organized to brainstorm about the plan and to retrieve input considering the layout and the design (Polis Award, n.d.; LBGO; 2019).

Figure A48: Mehrgenerationenhäuser Weyarn (Polis Award, n.d.).

Figure A49: Communal park-like garden at Mehrgenerationenhäuser Weyarn (LBGO, 2019).

Nr. 4.8 – Germany – Jaspern

A co-housing group which was initiated by a group of private households and individuals, was Jaspern, located in the urban context of Wien. The (future) residents were assisted by a management/development firm, specialized in CPC projects, of which the involved project manager also moved to Jaspern. The co-housing project aimed at private dwellings where everyone experiences sufficient privacy, but within a social context with common facilities, to improve quality of life and create social networks. In total, Jaspern consists of eighteen individual apartments, which are all energy neutral (passive house), as the residents attached great importance to sustainability (Kerbler, 2017).

Figure A50: Jaspern (Kerbler, 2017).

B – OVERVIEW PREVALENT COMMON FACILITIES

Overview of prevalent common facilities – indoor, outdoor and other – within the analyzed co-housing projects, ordered by country; Denmark, Netherlands, Belgium and Germany.

Country	Co-housing project	Location / city	Nr. of units	Size per unit (m2)	Context	Residents role during dev.	Common facilities															Common space area	
							Indoor								Outdoor					Other			
							Living room	Kitchen / dining room	Library / office room	Hobby room / atelier	Laundry room	Exercise room / gym	Wellness	Personal care facilities	Guest room	Terrace / garden	Agriculture	Outdoor kitchen	Outdoor game court	Swim. pool / pond	Shared bike parking	Housekeeper	Shared mobility	Common space (m2)	Common space / unit (m2)
Denmark																							
1.1	Sønderborg Bofællesskab	Sønderborg	44	66 - 86	Sub-urban	Passive	1	1	1	1	0	1	0	0	1	1	1	0	0	0	0	0	0	No info	/
1.2	Kamelia Hus	Copenhagen	49	44 - 71	Urban	Passive	0	1	1	1	1	0	0	0	0	1	1	1	0	0	1	0	0	No info	/
1.3	Balancen	Kildebjerg	33	55 - 100	Rural	Passive	0	1	1	1	0	0	0	0	1	1	0	0	0	0	1	0	1	300	9,1
1.4	Fremtidens Seniorbofaellesskab	Ringkobing	14	50 - 120	Rural	Passive	0	1	1	1	0	0	0	0	1	1	1	0	0	0	1	0	0	No info	/
1.5	Gartnerbyen	Odense	86	68 - 95	Urban	Passive	1	1	0	0	0	0	0	0	1	1	1	0	0	0	1	1	0	No info	/
1.6	Ibihaven	Slagelse	76	53 - 79	Rural	Passive	1	1	1	1	0	1	0	0	1	1	1	0	0	0	0	0	0	1.500	19,7
1.7	Broen	Koge	29	48 - 67	Urban	Active	1	1	0	1	1	0	0	0	1	1	1	0	0	0	0	0	0	No info	/
1.8	Den Rode Trad	Roskilde	75	62 - 101	Urban	Passive	1	1	0	0	0	0	0	0		1	0	0	0	0	1	0	1	No info	/
		Average:	*51*																				
Netherlands																							
2.1	Knarrenhof	Zwolle	48	70 - 120	Sub-urban	Passive	0	0	0	1	0	0	0	0	0	1	1	0	0	0	1	0	0	No info	/
2.2	De Schrijver	Eindhoven	21	75 - 104	Urban	Active	1	0	0	1	1	1	0	0	1	1	1	0	0	0	1	0	0	155	7,4
2.3	Cohousing Arnhem	Arnhem	32	61 - 145	Urban	Active	1	1	0	1	1	0	0	0	0	1	0	0	0	0	1	0	0	No info	/
2.4	Stadsveteraan	Amsterdam	106	45 - 55	Urban	Passive	1	1	1	1	1	0	0	0	0	1	0	0	0	0	1	0	1	No info	/
2.5	Nevel Nemas	Delft	34	± 100	Sub-urban	Passive	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	400	11,8
2.6	Parkentree	Schiedam	89	60 - 140	Sub-urban	Semi-active	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	No info	/
2.7	De Lindehoeve	Tilburg	10	77 - 160	Rural	Active	1	1	0	1	0	0	0	0	1	1	1	0	0	0	0	0	0	80	8,0
2.8	Buurtschap De Gast	Groningen	15	85 - 107	Rural	Active	1	0	0	1	0	0	0	0	1	1	1	0	0	0	1	0	0	110	7,3
		Average:	*44*																				
Belgium																							
3.1	Qville	Essen	43	80 - 125	Rural	Passive	1	0	1	0	0	0	1	0	0	1	1	1	1	1	1	0	1	No info	/
3.2	Negenhoek	Kortenberg	32	85 - 120	Rural	Passive	0	1	1	1	1	0	0	0	1	1	1	0	1	0	0	0	1	330	10,3
3.3	Villa de Proost	Rillaar	10	22 - 26	Rural	Passive	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	No info	/
3.4	De Notenkraker	Leuven	13	± 90	Urban	Passive	1	1	0	1	1	0	0	0	1	1	0	0	0	0	1	0	0	200	15,4
3.5	Wijg & Co	Wijgmaal	33	No info	Rural	Semi-active	0	1	1	1	1	0	0	0	1	1	1	0	1	0	1	0	0	No info	/
3.6	Kadans	Wijnegem	14	No info	Rural	Passive	1	0	0	0	0	0	1	0	1	1	1	0	0	1	1	0	1	No info	/
3.7	t Getouw	Malle	9	No info	Sub-urban	Semi-active	1	1	0	1	1	0	0	0	0	1	0	0	0	0	1	0	0	No info	/
3.8	Maison Biloba	Brussels	15	No info	Urban	Active	0	1	1	0	1	1	0	0	0	1	0	0	0	0	1	0	0	No info	/
		Average:	*21*																				
Germany																							
4.1	Amaryllis	Bonn	30	110	Sub-urban	Active	1	1	0	1	0	0	0	0	1	1	1	0	0	0	1	0	1	170	5,7
4.2	Andreasgärten	Erfurt	89	No info	Sub-urban	Passive	1	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	No info	/
4.3	Willda Wohnen	Wien	25	± 100	Urban	Active	1	1	1	1	1	0	1	0	1	1	1	0	0	0	1	0	0	No info	/
4.4	Zeppelinhof	Neuwied	14	50 - 70	Sub-urban	Active	1	0	1	0	0	0	0	0	0	1	1	0	0	0	1	0	0	No info	/
4.5	Fischbeker Höfe	Hamburg	116	24 - 90	Rural	Passive	1	1	1	0	0	1	1	0	1	1	1	0	1	0	1	0	0	No info	/
4.6	Buch am Erlbach-project	Buch am Erlbach	26	35 - 107	Sub-urban	Passive	1	1	0	0	0	0	0	0	0	1	0	0	1	0	1	0	1	37	1,4
4.7	Mehrgenerationenhäuser Weyarn	Weyarn	70	48 - 101	Rural	Semi-active	1	0	0	0	0	0	0	0	0	1	1	0	1	0	1	0	0	No info	/
4.8	Jaspern	Wien	18	No info	Urban	Active	1	1	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	No info	/
		Average:	*49*																				

Summary																			
	Indoor									Outdoor					Other				
	Living room	Kitchen / dining room	Library / office room	Hobby room / atelier	Laundry room	Exercise room / gym	Wellness (E.g. indoor swimming pool, sauna)	Personal care facilities	Guest room	Terrace / garden	Agriculture / greenhouse	Outdoor kitchen	Outdoor game court (E.g. Jeu de Boules)	Swimming pool / pond	Shared bike / scoot mobile parking	Housekeeper	Shared mobility		
Scandinavia	5	8	5	6	2	2	0	0	6	8	6	1	0	0	5	1	2		
Netherlands	7	4	1	7	3	1	0	0	3	8	4	0	0	0	5	0	1		
Belgium	5	6	4	4	5	1	2	0	4	8	4	1	3	2	6	0	3		
Germany	8	6	3	3	1	1	2	1	3	8	6	0	3	0	6	0	2		
Total	25	24	13	20	11	5	4	1	16	32	20	2	6	2	22	1	8		

C – COSTS OF COMMON FACILITIES

Within this appendix the cost calculations for the common facilities – included within the ranking experiment – will be discussed. To the extent possible, these cost calculations are based on figures, dimensions and information derived from the analyzed reference projects and other relevant sources of information. For aspects where unambiguous data was not available, making assumptions was necessary. Below, a number of general assumptions are given, after which the cost calculations per facility follow:

- Construction costs are based on a renowned Dutch construction cost databased called Bouwkostenkompas (Bouwkostenkompas, 2023), and also include finishing costs (in Dutch afbouwkosten);
- The formfactor and percentage for additional costs are also retrieved from Bouwkostenkompas;
- The additional costs include costs for designers (architect), advisors, municipal legal fees and such, and are calculated for all common facilities from small and relatively simple, to larger and/or more complex facilities;
- Land costs are not taken into account under the assumption that these will be covered by the private/individual dwellings;
- In addition to the total initial investment costs of each common facility, 21% VAT (btw) is charged.

Living room

Assumptions

- Based on analyzed reference projects and assumptions, a net area of fifty square meters is applied for the communal living room;
- The communal living room will be completed including décor (furniture, a television and such) for which a budget of € 10,000 is included (Nibud, 2023).

Initial investment costs

- Net area: 50 m2
- Form factor: 85%
- Gross area: 50 / 85% = 59 m2
- Construction costs: € 2,000 / m2 gross area
- Additional costs: 20% of construction costs
- Décor budget: € 10,000

Initial investment costs: ((59 * 2,000) * 1,20 + 10,000) * 1,21

Initial investment costs: **€ 183,436**

Kitchen with dining room

Assumptions

- Based on analyzed reference projects and assumptions, a net area of fifty square meters is applied for the communal kitchen with dining room;
- The communal kitchen with dining room will be completed including décor (furniture and such), for which a budget of € 10,000 is included;
- For the kitchen – including appliances – a separate budget of € 20,000 is included (Mandemakers, 2023).

Initial investment costs

- Net area: 50 m2
- Form factor: 85%
- Gross area: 50 / 85% = 59 m2
- Construction costs: € 2,000 / m2 gross area
- Additional costs: 20% of construction costs
- Décor budget: € 10,000
- Kitchen budget: € 20,000

Initial investment costs: ((59 * 2,000) * 1,20 + 10,000 + 20,000) * 1,21

Initial investment costs: **€ 207,636**

Shared bike parking

Assumptions

- It is assumed that the shared bike parking is an internal, structural space – and thus no canopy or comparable outdoor structure – where residents can park their bike freely and spaciously, without the need for a bicycle rack;
- The net area of the shared bike parking is approximated based on the project scale of 25 dwellings and under the assumption of 2.5 bikes for a two-person household (Hackmann, 2020) and standard measures for a bike parking, according to Bouwkundigdetailleren (2014);
- For the construction costs, a 20% discount has been applied/estimated, under the assumption that it concerns a basic, shell place.

Initial investment costs

- Net area: 65 m2
- Form factor: 85%
- Gross area: 65 / 85% = 76 m2
- Construction costs: € 2,000 * 0,80 = € 1,600 / m2 gross area
- Additional costs: 20% of construction costs

Initial investment costs: ((76 * 1,600) * 1,20) * 1,21

Initial investment costs: **€ 176,563**

Hobby room / atelier

Assumptions

- Based on analyzed reference projects and assumptions, a net area of thirty square meters is applied for the communal hobby room / atelier;
- The hobby room / atelier will be completed including décor (furniture and other relevant interior attributes/accessories) for which a budget of € 5,000 is included/estimated.

Initial investment costs

- Net area: 30 m2
- Form factor: 85%

- Gross area: 30 / 85% = 35 m2
- Construction costs: € 2,000 / m2 gross area
- Additional costs: 20% of construction costs
- Décor budget: € 5,000

Initial investment costs: ((35 * 2,000) * 1,20 + 5,000) * 1,21

Initial investment costs: **€ 107,690**

Guest room

Assumptions

- Based on analyzed reference projects and assumptions, a net area of twenty square meters is applied for the guest room;
- The guest room will be foreseen of a bedroom and bathroom, and does not include a kitchenette;
- The guest room will be completed including décor (furniture and finished bathroom) for which a budget of € 7,500 is included/estimated.

Initial investment costs

- Net area: 20 m2
- Form factor: 85%
- Gross area: 20 / 85% = 24 m2
- Construction costs: € 2,000 / m2 gross area
- Additional costs: 20% of construction costs
- Décor budget: € 7,500

Initial investment costs: ((24 * 2,000) * 1,20 + 7,500) * 1,21

Initial investment costs: **€ 78,771**

Library / office room

Assumptions

- Based on analyzed reference projects and assumptions, a net area of thirty square meters is applied for the communal library / office room;
- The hobby room / atelier will be completed including décor (furniture and other relevant interior attributes/accessories) for which a budget of € 7,500 is included/estimated.

Initial investment costs

- Net area: 30 m2
- Form factor: 85%
- Gross area: 30 / 85% = 35 m2
- Construction costs: € 2,000 / m2 gross area
- Additional costs: 20% of construction costs
- Décor budget: € 7,500

Initial investment costs: ((35 * 2,000) * 1,20 + 7,500) * 1,21

Initial investment costs: **€ 109,800**

Laundry room

Assumptions

- Based on analyzed reference projects and assumptions, a net floor area of fifteen square meters is assumed for the communal laundry room;
- The communal laundry room will be completed including a washing machine and dryer, whereby assumed that five washing machines and five dryers will be installed – one set per five households – for a budget of 1,500 per set (Wasje, 2023).

Initial investment costs

- Net area: 15 m2
- Form factor: 85%
- Gross area: 15 / 85% = 18 m2
- Construction costs: € 2,000 / m2 gross area
- Additional costs: 20% of construction costs
- Budget washing macing + dryer: € 1,250 * 5 = 6,250

Initial investment costs: ((18 * 2,000) * 1,20 + 6,250) * 1,21

Initial investment costs: **€ 59,835**

Exercise room / gym

Assumptions

- Based on analyzed reference projects and assumptions, a net area of fifty square meters is applied for the exercise room / gym;
- The communal exercise room / gym will be completed including décor (furniture, gym equipment and other relevant attributes/accessories) for a budget of € 15,000 (Gyminrichting, 2023).

Initial investment costs

- Net area: 50 m2
- Form factor: 85%
- Gross area: 50 / 85% = 59 m2
- Construction costs: € 2,000 / m2 gross area
- Additional costs: 20% of construction costs
- Gym equipment and such: € 15,000

Initial investment costs: ((59 * 2,000) * 1,20 + 15,000) * 1,21

Initial investment costs: **€ 189,486**

Wellness

Assumptions

- For the communal wellness and spa, a net floor area of forty square meters is assumed based on analyzed reference projects and assumptions;
- The assumed, and to be included facilities, concern a sauna, jacuzzi, steam bath and rain shower, for which the following prices are assumed:
  - Sauna: € 8,000 (Elite Wellness, 2023);
  - Jacuzzi: € 8,000 (Elite Wellness, 2023);
  - Steam bath: € 13,000 (Buldit BV, 2023);
  - Rain shower: € 1,000 (Saniweb, n.d.).
- For the construction costs, a 10% markup has been applied/estimated due to the higher complexity and additional measures regarding installations and building physics associated with a wellness.

Initial investment costs

- Net area: 40 m2
- Form factor: 85%
- Gross area: 40 / 85% = 47 m2
- Construction costs: € 2,000 * 1,10 = € 2,200 / m2 gross area
- Additional costs: 20% of construction costs
- Budget wellness facilities: € 30,000

Initial investment costs: ((47 * 2,200) * 1,20 + 30,000) * 1,21

Initial investment costs: **€ 186,437**

Garden with terrace

Assumptions

- Based on analyzed reference projects and assumptions, for the communal garden with terrace, an area of 750 m2 is applied;
- The costs for realizing the garden with terrace are based on key figures per square meter, retrieved from Bouwkostenkompas (2023);
- For garden furniture – such as benches and an outdoor table and chair set – a budget of € 7,500 is included/estimated (Tuinmeubelshop, 2023).

Initial investment costs

- Area: 750 m2
- Construction costs: € 100 / m2
- Additional costs: 20% of construction costs
- Garden furniture budget: € 7,500

Initial investment costs: ((750 * 100) * 1,20 + 7,500) * 1,21

Initial investment costs: **€ 117,975**

Agricultural facilities

Assumptions

- The agricultural facilities consist of a small area of agricultural land and, in addition, a greenhouse;
- Based on analyzed reference projects and assumptions, for the agricultural land an area of 150 m2 is applied;
- For the agricultural greenhouse, a spacious model applied of 25 m2, for which a budget of € 6,000 is reserved (Tuinkasspecialist, 2023).

Initial investment costs

- Area: 150 m2
- Land preparation costs: € 50 / m2
- Additional costs: 20% of construction costs
- Greenhouse budget: € 5,000

Initial investment costs: ((150 * 50) * 1,20 + 6,000) * 1,21

Initial investment costs: **€ 18,150**

Outdoor game court

Assumptions

- The outdoor game court consists of two Jeu de Boules courts, with some benches besides them;
- For the Jeu de Boules courts, a budget of € 3,500 per court is reserved (Nederlandse Jeu de Boules Bond, 2020) and for the benches a provisional sum of € 700 per bench is counted (Glasdon, 2021).

Initial investment costs

- Jeu de Boules court budget: € 3,500 * 2 = € 7,000
- Garden furniture budget: € 700 * 2 = € 1,400
- Additional costs: 20% of construction costs

Initial investment costs: ((7,000 + 1,400) * 1,20) * 1,21

Initial investment costs: **€ 12,197**

Outdoor kitchen

Assumptions

- The outdoor kitchen includes a high-quality canopy of thirty square meters, and garden furniture, for which the following prices are assumed:
  - Outdoor kitchen: € 5,000 (Buitenkeukendeal, 2022);
  - Canopy (including paving): € 1,200 / m2 * 30 = € 36,000 (Bouwkostenkompas, 2023);
  - Garden furniture: € 5,000 (Tuinmeubelshop, 2023).

Initial investment costs

- Canopy budget: € 36,000
- Outdoor kitchen + furniture budget: € 10,000
- Additional costs: 20% of construction costs

Initial investment costs: ((36,000 + 10,000) * 1,20) * 1,21

Initial investment costs: **€ 66,792**

Swimming pool

Assumptions

- The swimming pool concerns a qualitative outdoor pool, including site finishing, for which a budget is reserved of € 60,000 (Solvari, 2023);
- This price includes relevant accessories and amenities, such as pool heating and a roll cover.

Initial investment costs

- Swimming pool budget: € 60,000
- Additional costs: 20% of construction costs

Initial investment costs: (60,000 * 1,20) * 1,21

Initial investment costs: **€ 87,120**

Shared mobility

Assumptions

- The shared mobility facility consists of shared cars, and thus no other mobility types/forms;
- Since there was no recommended standard/norm for the amount of shared cars per household, the assumption is made that the 25 co-housing households share three A-segment lease cars;
- Within the monthly costs of the shared cars, budgets for maintenance or fuel are excluded.

Initial investment costs

- The total initial investment costs are not applicable since the assumption is made that the shared cars will be leased;
- According to current market price information, leasing a new A-segment car (e.g. Volkswagen Up), costs € 290 per month per car.

D – COTS OVERVIEW COMMON FACILITIES

Overview of costs of common facilities, whereby the total mortgage amount (total initial investment costs) has been discounted towards a monthly mortgage fee per household, per common facility.

General assumptions	
Interest rate	4,43%
Term in years	30
Term in months	360
Interest / month	0,3619%

Mortgage fee calculations per common facility			
Common facility	**Mortgage amount**	**Total monthly fee**	**Monthly fee per household**
Living room	€ 183.436	€ 912,36	€ 36
Kitchen with dining room	€ 207.636	€ 1.032,72	€ 41
Shared bike parking	€ 176.563	€ 878,17	€ 35
Hobby room / atelier	€ 107.690	€ 535,62	€ 21
Guest room	€ 78.771	€ 391,78	€ 16
Library / office room	€ 109.800	€ 546,11	€ 22
Laundry room	€ 59.835	€ 297,60	€ 12
Exercise room / gym	€ 189.486	€ 942,45	€ 38
Wellness	€ 186.437	€ 927,28	€ 37
Garden with terrace	€ 117.975	€ 586,77	€ 23
Vegetable garden	€ 18.150	€ 90,27	€ 4
Jeu de boules courts	€ 12.197	€ 60,66	€ 2
Outdoor kitchen	€ 66.792	€ 332,20	€ 13
Swimming pool	€ 87.120	€ 433,31	€ 17
Shared mobility	Not applicable	€ 870,00	€ 35

E – QUESTIONNAIRE DESIGN

Introductie pagina

Mijn naam is Niels Mans, student aan de Technische Universiteit in Eindhoven, en momenteel bezig met mijn afstudeeronderzoek. Ik vraag u vriendelijk deze enquête in te vullen, waarmee u mij helpt bij mijn afstudeerproject. Het onderzoek gaat over de woonvoorkeuren van (toekomstige) ouderen, in relatie tot 'co-housing', een woonconcept waarbij ieder huishouden zijn eigen 'traditionele' privéwoning heeft en één of meerdere faciliteiten gedeeld worden tussen bewoners (zoals een woonkamer of moestuin), om sociaal contact en burenhulp te stimuleren.

De centrale vraag is welke gedeelde faciliteiten de grootste voorkeur hebben.

Het invullen van deze enquête duurt ca. 8 minuten. U beantwoordt eerst een aantal vragen over uw huidige woonsituatie. Daarna volgen twee rangschikkings-vragen met betrekking tot gedeelde faciliteiten. Tot slot volgen een aantal vragen over persoonskenmerken.

Deelname aan dit onderzoek is geheel vrijwillig en volledig anoniem. De resultaten worden alleen gebruikt voor dit specifieke onderzoek.

Wanneer u vragen heeft kunt u mij altijd e-mailen: n.mans@student.tue.nl.

Bij voorbaat bedankt voor uw deelname aan mijn onderzoek.

Met vriendelijke groet, Niels Mans

Toestemming voor deelname

Deelname aan dit onderzoek is geheel vrijwillig. Volgens de wet moet ik eerst uw toestemming vragen. Lees deze informatie alstublieft door, voordat u toestemming geeft.

Door dit toestemmingsformulier te ondertekenen erken ik het volgende:

1. Ik ben voldoende geïnformeerd over het onderzoek. Ik heb het informatieblad gelezen en heb de mogelijkheid gehad vragen te stellen.
2. Ik neem geheel vrijwillig deel aan dit onderzoek. Het is mij duidelijk dat ik deelname aan het onderzoek op elk moment, zonder opgaaf van reden, kan beëindigen.

Gaat u akkoord met deelname?

☐ Ja

☐ Nee

Deel 1: Woonsituatie

Dit deel van de enquête bevat vragen over uw huidige woonsituatie en algemene vragen over co-housing.

Vraag 1: Woont u in een koop- of huurwoning?

☐ Koopwoning
☐ Huurwoning corporatie
☐ Huurwoning vrije sector

Vraag 2: In wat voor soort woning woont u momenteel?

☐ Vrijstaande woning
☐ Tweekapper
☐ Hoekwoning
☐ Tussenwoning
☐ Bungalow
☐ Appartement
☐ Anders, namelijk …

Vraag 3: Heeft u al eens eerder van het co-housing concept gehoord?

☐ Nee, ik heb hier nog niet eerder van gehoord
☐ Ja ik heb er van gehoord, maar nog nooit iets mee te maken gehad
☐ Ja ik heb er van gehoord, en heb hier ook wel eens mee te maken gehad

Vraag 4: Beschikt u in uw huidige woonsituatie over gedeelde faciliteiten? Hieronder worden ruimtes en faciliteiten verstaan, welke (vrijblijvend) gedeeld en gebruikt worden door bewoners van een 'woon-gemeenschap', naast hun private woning.

☐ Nee
☐ Ja, een woonkamer
☐ Ja, een keuken met eethoek
☐ Ja, een gedeelde fietsenstalling (binnen)
☐ Ja, een hobbyruimte / atelier
☐ Ja, een logeerkamer(s)
☐ Ja, een bibliotheekkamer met werkplekken
☐ Ja, een wasruimte
☐ Ja, een sportruimte
☐ Ja, een wellness ruimte
☐ Ja, een gedeelde tuin met terras
☐ Ja, een groentetuin
☐ Ja, een Jeu de boules baan
☐ Ja, een buitenkeuken met overkapping
☐ Ja, een buitenzwembad
☐ Ja, een deelauto service
☐ Ja, ander, namelijk …

Vraag 5: Maakt u wel eens gebruik van deel-economie faciliteiten en zo ja met welke frequentie? Denk aan platformen voor het delen van goederen (bijv. gereedschap), vervoer, huisvesting (bijv. Air-bnb), werkplekken etc.

☐ Nee
☐ Ja, wekelijks
☐ Ja, maandelijks
☐ Ja, driemaandelijks (per kwartaal)
☐ Ja, zesmaandelijks (per ½ jaar)
☐ Ja, jaarlijks

Deel 2: Introductie

Stelt u zich voor dat u naar een co-housing project gaat verhuizen. Binnen dit co-housing project beschikt ieder huishouden over een eigen private woning, en zullen één of meerdere gedeelde faciliteiten gerealiseerd worden. De volgende gedeelde faciliteiten zijn hierbij mogelijk:

- Bibliotheekkamer met werkplekken
- Buitenkeuken met overkapping
- Buitenzwembad
- Deelauto service
- Gedeelde fietsenstalling (binnen)
- Gedeelde tuin met terras
- Groentetuin met kas
- Hobbyruimte / atelier
- Jeu de boules baan
- Keuken met eethoek
- Logeerkamer met eigen badkamer
- Sportruimte met sportapparatuur
- Wasruimte met wasmachines en drogers
- Wellness ruimte met een sauna en jacuzzi
- Woonkamer

Deel 2A: Rangschikking 2A

Vraag 6: Onderstaand volgt de selectie van de 15 verschillende gedeelde faciliteiten. Aan u wordt gevraagd uw persoonlijke top 6 hieruit samen te stellen. Rangschik de 6 meest gewilde faciliteiten van boven naar beneden, van hoogste naar laagste voorkeur.

- Bibliotheekkamer met werkplekken
- Buitenkeuken met overkapping
- Buitenzwembad
- Deelauto service
- Gedeelde fietsenstalling (binnen)
- Gedeelde tuin met terras

- Groentetuin met kas
- Hobbyruimte / atelier
- Jeu de boules baan
- Keuken met eethoek
- Logeerkamer
- Sportruimte
- Wasruimte
- Wellness ruimte
- Woonkamer

Deel 2B: Rangschikking 2B

De realisatie van de gedeelde faciliteiten vraagt om een gezamenlijke investering van de co-housing bewoners. Voor iedere faciliteit zijn de totale investeringskosten berekend, welke omgerekend zijn naar extra maandelijkse kosten per huishouden.

Vraag 7: Aan u wordt wederom gevraagd om uit de onderstaande 15 faciliteiten met bijbehorende kosten, uw persoonlijke top 6 samen te stellen, waarbij rekening houdend met de extra maandelijkse kosten. Rangschik van hoogste naar laagste voorkeur.

• Bibliotheekkamer met werkplekken	€ 22 / maand
• Buitenkeuken met overkapping	€ 13 / maand
• Buitenzwembad	€ 17 / maand
• Deelauto service	€ 35 / maand
• Gedeelde fietsenstalling (binnen)	€ 35 / maand
• Gedeelde tuin met terras	€ 23 / maand
• Groentetuin met kas	€ 4 / maand
• Hobbyruimte / atelier	€ 21 / maand
• Jeu de boules baan	€ 2 / maand
• Keuken met eethoek	€ 41 / maand
• Logeerkamer	€ 16 / maand
• Sportruimte	€ 38 / maand
• Wasruimte	€ 12 / maand
• Wellness ruimte	€ 37 / maand
• Woonkamer	€ 36 / maand

Deel 3: Persoonskenmerken

Dit laatste onderdeel bevat vragen over u als persoon, om in beeld te brengen hoe de groep respondenten er uit ziet. Ook bij dit onderdeel geldt dat alle te verzamelen informatie volledig anoniem verwerkt wordt.

Vraag 8: Wat is de 4-cijferige postcode van uw huidige woonadres?

[……..]

Vraag 9: Met welk geslacht identificeert u zichzelf?

☐ Man
☐ Vrouw
☐ Anders / zeg ik liever niet

Vraag 10: Tot welke leeftijdscategorie behoort u?

☐ ≤ 49 jaar
☐ 50 – 55 jaar
☐ 56 – 60 jaar
☐ 61 – 65 jaar
☐ 66 – 70 jaar
☐ 71 – 75 jaar
☐ 76 – 80 jaar
☐ ≥ 81 jaar

Vraag 11: Wat is uw hoogst behaalde opleiding?

☐ Basisschool
☐ Middelbare school
☐ Lager beroepsonderwijs (LBO)
☐ Middelbaar beroepsonderwijs (MBO)
☐ Bachelor (HBO of universiteit)
☐ Master of doctoraal
☐ Anders, namelijk …
☐ Zeg ik liever niet

Vraag 12: Wat is uw huishoud samenstelling?

☐ Alleenstaand
☐ Samenwonend met partner, zonder kinderen
☐ Samenwonend met partner, met kinderen
☐ Eenoudergezin
☐ Anders, namelijk …
☐ Zeg ik liever niet

Vraag 13: Uit hoeveel personen bestaat uw huishouden, inclusief uzelf?

☐ 1 persoon
☐ 2 personen
☐ 3 personen

☐ 4 personen
☐ 5 of meer personen

Vraag 14: Welke van de volgende categorieën omschrijft het beste uw arbeidssituatie?

☐ Ik werk voltijd (35 uur of meer per week)
☐ Ik werk deeltijd (20 tot 35 uur per week)
☐ Ik werk deeltijd (minder dan 20 uur per week)
☐ Niet werkzaam; gepensioneerd
☐ Niet werkzaam; werkloos / arbeidsongeschikt
☐ Niet werkzaam; overig
☐ Anders
☐ Zeg ik liever niet

Vraag 15: Binnen welke werksector bent u actief?

☐ Ik ben niet (meer) werkzaam
☐ Zakelijke dienstverlening
☐ Zorg
☐ Handel
☐ Industrie
☐ Onderwijs
☐ Bouwnijverheid
☐ Openbaar bestuur
☐ Horeca
☐ Cultuur, recreatie, overige diensten
☐ Vervoer en opslag
☐ Informatie en communicatie
☐ Landbouw en visserij
☐ Financiële dienstverlening
☐ Verhuur en handel van onroerend goed
☐ Waterbedrijven en afvalbeheer
☐ Energievoorziening
☐ Delfstoffenwinning
☐ Anders, namelijk …

Vraag 16: Wat is het totale bruto jaarinkomen van u en uw eventuele partner tezamen?

☐ 0 tot ½ keer modaal inkomen: €0 – €20.000
☐ ½ tot 1 keer modaal inkomen: €20.001 – €40.000
☐ 1 tot 1½ keer modaal inkomen: €40.001 – €60.000
☐ 1½ tot 2 keer modaal inkomen: €60.001 – €80.000
☐ Meer dan 2 keer modaal inkomen: > €80.000
☐ Zeg ik liever niet

Vraag 17: In welke mate bent u na het invullen van deze enquête geïnteresseerd in co-housing, waarvan onderdeel het (vrijblijvend) delen van ruimtes en faciliteiten met medebewoners?

☐ Sterk ongeïnteresseerd
☐ Ongeïnteresseerd
☐ Neutraal
☐ Geïnteresseerd
☐ Sterk geïnteresseerd

Afsluiting

Dit is het einde van deze vragenlijst. Hartelijk bedankt voor uw deelname. Wanneer u vragen en/of opmerkingen heeft, bent u welkom deze hieronder te vermelden.

Met meer respondenten wordt mijn onderzoek beter, dus de link van dit onderzoek gerust met anderen!

Nogmaals bedankt en een vriendelijk groet, Niels Mans

F – SAMPLE CHARACTERISTICS TABLE OVERVIEW

Gender	Frequency	Percent	Cumulative
Male	267	60,5%	60,5%
Female	171	38,8%	99,3%
Otherwise / I would rather not say	3	0,7%	100,0%
Total	441	100,0%	

Age	Frequency	Percent	Cumulative
≤ 49 years	87	19,7%	19,7%
50 - 55 years	52	11,8%	31,5%
56 - 60 years	84	19,0%	50,6%
61 - 65 years	81	18,4%	68,9%
66 - 70 years	65	14,7%	83,7%
71 - 75 years	43	9,8%	93,4%
76 - 80 years	23	5,2%	98,6%
≥ 81 years	6	1,4%	100,0%
Total	441	100,0%	

Education level	Frequency	Percent	Cumulative
Primary school	1	0,2%	0,2%
Secondary school	17	3,9%	4,1%
Lower Vocational Education (LBO)	2	0,5%	4,5%
Intermediate Vocational Education (MBO)	86	19,5%	24,0%
Bachelor's Degree (HBO or University)	206	46,7%	70,7%
Master's or Doctoral Degree	127	28,8%	99,5%
I would rather not say	2	0,5%	100,0%
Total	441	100,0%	

Household composition	Frequency	Percent	Cumulative
Single	76	17,2%	17,2%
Cohabiting with partner, without children	215	48,8%	66,0%
Cohabiting with partner, with children	138	31,3%	97,3%
Single-parent family	12	2,7%	100,0%
Otherwise / I would rather not say	0	0,0%	100,0%
Total	441	100,0%	

Household size	Frequency	Percent	Cumulative
1 person	76	17,2%	17,2%
2 persons	227	51,5%	68,7%
3 persons	49	11,1%	79,8%
4 persons	67	15,2%	95,0%
5 or more persons	22	5,0%	100,0%
Total	441	100,0%	

Employment status	Frequency	Percent	Cumulative
Fulltime (35 or more hours per week)	188	42,6%	42,6%
Parttime (20 to 35 hours per week)	80	18,1%	60,8%
Parttime (less than 20 hours per week)	19	4,3%	65,1%
Not working; retired	125	28,3%	93,4%
Not working; unemployed / unfit to work	12	2,7%	96,1%
Not working; otherwise	9	2,0%	98,2%
I would rather not say	8	1,8%	100,0%
Total	441	100,0%	

Profession field	Frequency	Percent	Cumulative
No longer employed	130	29,5%	29,5%
Construction sector	82	18,6%	48,1%
Business services	63	14,3%	62,4%
Healthcare	38	8,6%	71,0%
Education	34	7,7%	78,7%
Real estate rental and trade	17	3,9%	82,5%
Public administration	16	3,6%	86,2%
Trade	14	3,2%	89,3%
Industry	11	2,5%	91,8%
Information and communication	9	2,0%	93,9%
Financial services	9	2,0%	95,9%
Culture, recreation and other services	7	1,6%	97,5%
Transportation and storage	6	1,4%	98,9%
Agriculture and fisheries	2	0,5%	99,3%
Hospitality	2	0,5%	99,8%
Water companies and waste management	1	0,2%	100,0%
Energy supply	0	0,0%	100,0%
Mining industry	0	0,0%	100,0%
Total	441	100,0%	

Household income	Frequency	Percent	Cumulative
0 to ½ modal salary: €0 – €20,000	9	2,0%	2,0%
½ to 1 modal salary: €20,001 – €40,000	50	11,3%	13,4%
1 to 1½ modal salary: €40,001 – €60,000	100	22,7%	36,1%
1½ to 2 modal salary: €60,001 – €80,000	89	20,2%	56,2%
More than twice modal salary: > €80,000	150	34,0%	90,2%
I would rather not say	43	9,8%	100,0%
Total	441	100,0%	

Home ownership	Frequency	Percent	Cumulative
Owner-occupied dwelling	398	90,2%	90,2%
Rental dwelling - housing association	23	5,2%	95,5%
Rental dwelling - private rental sector	20	4,5%	100,0%
Total	441	100,0%	

Dwelling type	Frequency	Percent	Cumulative
Detached house	151	34,2%	34,2%
Semi-detached house	96	21,8%	56,0%
Corner house	36	8,2%	64,2%
Terraced house	71	16,1%	80,3%
Bungalow	14	3,2%	83,4%
Apartment	73	16,6%	100,0%
Total	441	100,0%	

Living area - Urbanization degree	Frequency	Percent	Cumulative
Very strongly urbanized	66	15,0%	15,0%
Strongly urbanized	133	30,2%	45,1%
Moderately urbanized	93	21,1%	66,2%
Limitedly urbanized	113	25,6%	91,8%
Not urbanized	36	8,2%	100,0%
Total	441	100,0%	

Familiarity with co-housing	Frequency	Percent	Cumulative
Have not heard of this before	125	28,3%	28,3%
Have heard of it, but no experience	231	52,4%	80,7%
Have heard of it, and have experience	85	19,3%	100,0%
Total	441	100,0%	

Common facilities in current housing situation	Frequency	Percent	Cumulative
No disposal of CF	381	86,4%	86,4%
Disposal of CF	60	13,6%	100,0%
Total	441	100,0%	

Common facilities in current housing situation	Frequency	Percent	Cumulative
Shared bike parking	36	60,0%	
Garden with terrace	35	58,3%	
Living room	23	38,3%	
Laundry room	18	30,0%	
Hobby room / atelier	18	30,0%	
Kitchen with dining room	17	28,3%	
Vegetable garden + greenhouse	10	16,7%	
Guest room	10	16,7%	
Library / office room	5	8,3%	
Jeu de boules court	4	6,7%	
Exercise room / gym	4	6,7%	
Shared car service	4	6,7%	
Outdoor kitchen	3	5,0%	
Outdoor swimming pool	1	1,7%	
Wellness area	1	1,7%	
Total			

**Percentages calculated over respondents who do dispose of common facilities in current housing situation.*

Usage of sharing economy	Frequency	Percent	Cumulative
No	311	70,5%	70,5%
Yes, weekly	19	4,3%	74,8%
Yes, monthly	31	7,0%	81,9%
Yes, quarterly	21	4,8%	86,6%
Yes, half-yearly	17	3,9%	90,5%
Yes, yearly	42	9,5%	100,0%
Total	441	100,0%	

Degree of interest in co-housing	Frequency	Percent	Cumulative
Strongly uninterested	33	7,5%	7,5%
Uninterested	53	12,0%	19,5%
Neutral	123	27,9%	47,4%
Interested	136	30,8%	78,2%
Strongly interested	96	21,8%	100,0%
Total	441	100,0%	

G – OUTPUT BIVARIATE ANALYSIS

Bivariate analysis: interest in co-housing versus gender

Met welk geslacht identificeert u zichzelf? * In welke mate bent u na het invullen van deze enquête geïnteresseerd in co-housing, waarvan onderdeel het (vrijblijvend) delen van ruimtes en faciliteiten met medebewoners? Crosstabulation

			In welke mate bent u na het invullen van deze enquête geïnteresseerd in co-housing, waarvan onderdeel het (vrijblijvend) delen van ruimtes en faciliteiten met medebewoners?					
			Sterk ongeïnteresseerd	Ongeïnteresseerd	Neutraal	Geïnteresseerd	Sterk geïnteresseerd	Total
Met welk geslacht identificeert u zichzelf?	Man	Count	19	42	93	78	35	267
		Expected Count	20,0	32,1	74,5	82,3	58,1	267,0
		% within Met welk geslacht identificeert u zichzelf?	7,1%	15,7%	34,8%	29,2%	13,1%	100,0%
		% of Total	4,3%	9,5%	21,1%	17,7%	7,9%	60,5%
	Vrouw	Count	13	11	29	58	60	171
		Expected Count	12,8	20,6	47,7	52,7	37,2	171,0
		% within Met welk geslacht identificeert u zichzelf?	7,6%	6,4%	17,0%	33,9%	35,1%	100,0%
		% of Total	2,9%	2,5%	6,6%	13,2%	13,6%	38,8%
	Anders / zeg ik liever niet	Count	1	0	1	0	1	3
		Expected Count	,2	,4	,8	,9	,7	3,0
		% within Met welk geslacht identificeert u zichzelf?	33,3%	0,0%	33,3%	0,0%	33,3%	100,0%
		% of Total	0,2%	0,0%	0,2%	0,0%	0,2%	0,7%
Total		Count	33	53	123	136	96	441
		Expected Count	33,0	53,0	123,0	136,0	96,0	441,0
		% within Met welk geslacht identificeert u zichzelf?	7,5%	12,0%	27,9%	30,8%	21,8%	100,0%
		% of Total	7,5%	12,0%	27,9%	30,8%	21,8%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	47,559[a]	8	<,001
Likelihood Ratio	48,407	8	<,001
N of Valid Cases	441		

a. 5 cells (33,3%) have expected count less than 5. The minimum expected count is ,22.

Since 33.3% of the e_i's is smaller than five, the threshold value of 20.0% is exceeded. Therefore, 'men' and 'otherwise / I would rather not say' will be combined, with the purpose of reducing this percentage below 20.0%. See below.

Met welk geslacht identificeert u zichzelf? * In welke mate bent u na het invullen van deze enquête geïnteresseerd in co-housing, waarvan onderdeel het (vrijblijvend) delen van ruimtes en faciliteiten met medebewoners? Crosstabulation

			In welke mate bent u na het invullen van deze enquête geïnteresseerd in co-housing, waarvan onderdeel het (vrijblijvend) delen van ruimtes en faciliteiten met medebewoners?					
			Sterk ongeïnteresseerd	Ongeïnteresseerd	Neutraal	Geïnteresseerd	Sterk geïnteresseerd	Total
Met welk geslacht identificeert u zichzelf?	Man + Anders / zeg ik liever niet	Count	20	42	94	78	36	270
		Expected Count	20,2	32,4	75,3	83,3	58,8	270,0
		% within Met welk geslacht identificeert u zichzelf?	7,4%	15,6%	34,8%	28,9%	13,3%	100,0%
		% of Total	4,5%	9,5%	21,3%	17,7%	8,2%	61,2%
	Vrouw	Count	13	11	29	58	60	171
		Expected Count	12,8	20,6	47,7	52,7	37,2	171,0
		% within Met welk geslacht identificeert u zichzelf?	7,6%	6,4%	17,0%	33,9%	35,1%	100,0%
		% of Total	2,9%	2,5%	6,6%	13,2%	13,6%	38,8%
Total		Count	33	53	123	136	96	441
		Expected Count	33,0	53,0	123,0	136,0	96,0	441,0
		% within Met welk geslacht identificeert u zichzelf?	7,5%	12,0%	27,9%	30,8%	21,8%	100,0%
		% of Total	7,5%	12,0%	27,9%	30,8%	21,8%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	42,842[a]	4	<,001
Likelihood Ratio	43,597	4	<,001
N of Valid Cases	441		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 12,80.

After combining the categories 'men' and 'otherwise / I would rather not say' are combined, the threshold value is below 20.0% wherewith this condition is met. The asymptotic significance is < 0.05 wherewith H0 is rejected.

Bivariate analysis: interest in co-housing versus age

Tot welke leeftijdscategorie behoort u? * In welke mate bent u na het invullen van deze enquête geïnteresseerd in co-housing, waarvan onderdeel het (vrijblijvend) delen van ruimtes en faciliteiten met medebewoners? Crosstabulation

			In welke mate bent u na het invullen van deze enquête geïnteresseerd in co-housing, waarvan onderdeel het (vrijblijvend) delen van ruimtes en faciliteiten met medebewoners?					
			Sterk ongeïnteresseerd	Ongeïnteresseerd	Neutraal	Geïnteresseerd	Sterk geïnteresseerd	Total
Tot welke leeftijdscategorie behoort u?	≤ 49 jaar	Count	8	15	29	27	8	87
		Expected Count	6,5	10,5	24,3	26,8	18,9	87,0
		% within Tot welke leeftijdscategorie behoort u?	9,2%	17,2%	33,3%	31,0%	9,2%	100,0%
		% of Total	1,8%	3,4%	6,6%	6,1%	1,8%	19,7%
	50 – 65 jaar	Count	14	22	64	66	51	217
		Expected Count	16,2	26,1	60,5	66,9	47,2	217,0
		% within Tot welke leeftijdscategorie behoort u?	6,5%	10,1%	29,5%	30,4%	23,5%	100,0%
		% of Total	3,2%	5,0%	14,5%	15,0%	11,6%	49,2%
	≥ 66 jaar	Count	11	16	30	43	37	137
		Expected Count	10,3	16,5	38,2	42,2	29,8	137,0
		% within Tot welke leeftijdscategorie behoort u?	8,0%	11,7%	21,9%	31,4%	27,0%	100,0%
		% of Total	2,5%	3,6%	6,8%	9,8%	8,4%	31,1%
Total		Count	33	53	123	136	96	441
		Expected Count	33,0	53,0	123,0	136,0	96,0	441,0
		% within Tot welke leeftijdscategorie behoort u?	7,5%	12,0%	27,9%	30,8%	21,8%	100,0%
		% of Total	7,5%	12,0%	27,9%	30,8%	21,8%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	14,590[a]	8	,068
Likelihood Ratio	16,103	8	,041
N of Valid Cases	441		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 6,51.

The threshold value for e_i is below 20.0% wherewith this condition is met. Assuming a 95% confidence level, H0 is accepted with an asymptotic significance value of 0.068 for the Chi-square.

Bivariate analysis: interest in co-housing versus education level

Wat is uw hoogst behaalde opleiding? * In welke mate bent u na het invullen van deze enquête geïnteresseerd in co-housing, waarvan onderdeel het (vrijblijvend) delen van ruimtes en faciliteiten met medebewoners? Crosstabulation

			In welke mate bent u na het invullen van deze enquête geïnteresseerd in co-housing, waarvan onderdeel het (vrijblijvend) delen van ruimtes en faciliteiten met medebewoners?					
			Sterk ongeïnteresseerd	Ongeïnteresseerd	Neutraal	Geïnteresseerd	Sterk geïnteresseerd	Total
Wat is uw hoogst behaalde opleiding?	Basisschool, Middelbare school, LBO	Count	1	3	8	6	2	20
		Expected Count	1,5	2,4	5,6	6,2	4,4	20,0
		% within Wat is uw hoogst behaalde opleiding?	5,0%	15,0%	40,0%	30,0%	10,0%	100,0%
		% of Total	0,2%	0,7%	1,8%	1,4%	0,5%	4,5%
	Middelbaar beroepsonderwijs	Count	6	17	26	26	11	86
		Expected Count	6,4	10,3	24,0	26,5	18,7	86,0
		% within Wat is uw hoogst behaalde opleiding?	7,0%	19,8%	30,2%	30,2%	12,8%	100,0%
		% of Total	1,4%	3,9%	5,9%	5,9%	2,5%	19,5%
	Bachelor (HBO of universiteit)	Count	20	21	56	59	52	208
		Expected Count	15,6	25,0	58,0	64,1	45,3	208,0
		% within Wat is uw hoogst behaalde opleiding?	9,6%	10,1%	26,9%	28,4%	25,0%	100,0%
		% of Total	4,5%	4,8%	12,7%	13,4%	11,8%	47,2%
	Master of doctoraal	Count	6	12	33	45	31	127
		Expected Count	9,5	15,3	35,4	39,2	27,6	127,0
		% within Wat is uw hoogst behaalde opleiding?	4,7%	9,4%	26,0%	35,4%	24,4%	100,0%
		% of Total	1,4%	2,7%	7,5%	10,2%	7,0%	28,8%
Total		Count	33	53	123	136	96	441
		Expected Count	33,0	53,0	123,0	136,0	96,0	441,0
		% within Wat is uw hoogst behaalde opleiding?	7,5%	12,0%	27,9%	30,8%	21,8%	100,0%
		% of Total	7,5%	12,0%	27,9%	30,8%	21,8%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	17,146[a]	12	,144
Likelihood Ratio	17,302	12	,139
N of Valid Cases	441		

a. 3 cells (15,0%) have expected count less than 5. The minimum expected count is 1,50.

The threshold value for e_i is below 20.0% wherewith this condition is met. Assuming a 95% confidence level, H0 is accepted with an asymptotic significance value of 0.144.

Bivariate analysis: interest in co-housing versus household composition

Wat is uw huishoud samenstelling? * In welke mate bent u na het invullen van deze enquête geïnteresseerd in co-housing, waarvan onderdeel het (vrijblijvend) delen van ruimtes en faciliteiten met medebewoners? Crosstabulation

			In welke mate bent u na het invullen van deze enquête geïnteresseerd in co-housing, waarvan onderdeel het (vrijblijvend) delen van ruimtes en faciliteiten met medebewoners?					
			Sterk ongeïnteresseerd	Ongeïnteresseerd	Neutraal	Geïnteresseerd	Sterk geïnteresseerd	Total
Wat is uw huishoud samenstelling?	Alleenstaand	Count	4	2	17	22	31	76
		Expected Count	5,7	9,1	21,2	23,4	16,5	76,0
		% within Wat is uw huishoud samenstelling?	5,3%	2,6%	22,4%	28,9%	40,8%	100,0%
		% of Total	0,9%	0,5%	3,9%	5,0%	7,0%	17,2%
	Samenwonend met partner, zonder kind(eren)	Count	13	29	53	69	51	215
		Expected Count	16,1	25,8	60,0	66,3	46,8	215,0
		% within Wat is uw huishoud samenstelling?	6,0%	13,5%	24,7%	32,1%	23,7%	100,0%
		% of Total	2,9%	6,6%	12,0%	15,6%	11,6%	48,8%
	Samenwonend met partner, met kind(eren)	Count	14	22	52	41	9	138
		Expected Count	10,3	16,6	38,5	42,6	30,0	138,0
		% within Wat is uw huishoud samenstelling?	10,1%	15,9%	37,7%	29,7%	6,5%	100,0%
		% of Total	3,2%	5,0%	11,8%	9,3%	2,0%	31,3%

	Eenoudergezin	Count	2	0	1	4	5	12
		Expected Count	,9	1,4	3,3	3,7	2,6	12,0
		% within Wat is uw huishoud samenstelling?	16,7%	0,0%	8,3%	33,3%	41,7%	100,0%
		% of Total	0,5%	0,0%	0,2%	0,9%	1,1%	2,7%
Total		Count	33	53	123	136	96	441
		Expected Count	33,0	53,0	123,0	136,0	96,0	441,0
		% within Wat is uw huishoud samenstelling?	7,5%	12,0%	27,9%	30,8%	21,8%	100,0%
		% of Total	7,5%	12,0%	27,9%	30,8%	21,8%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	51,156[a]	12	<,001
Likelihood Ratio	57,467	12	<,001
N of Valid Cases	441		

a. 5 cells (25,0%) have expected count less than 5. The minimum expected count is ,90.

Since 25.0% of the e_i's is smaller than five, the threshold value of 20.0% is exceeded. Therefore, 'single-parent family' will be combined with 'cohabiting with partner, with children', with the purpose of reducing this percentage below 20.0%. By combining these groups families with children are combined. See below.

Wat is uw huishoud samenstelling? * In welke mate bent u na het invullen van deze enquête geïnteresseerd in co-housing, waarvan onderdeel het (vrijblijvend) delen van ruimtes en faciliteiten met medebewoners? Crosstabulation

			In welke mate bent u na het invullen van deze enquête geïnteresseerd in co-housing, waarvan onderdeel het (vrijblijvend) delen van ruimtes en faciliteiten met medebewoners?					
			Sterk ongeïnteresseerd	Ongeïnteresseerd	Neutraal	Geïnteresseerd	Sterk geïnteresseerd	Total
Wat is uw huishoud samenstelling?	Alleenstaand	Count	4	2	17	22	31	76
		Expected Count	5,7	9,1	21,2	23,4	16,5	76,0
		% within Wat is uw huishoud samenstelling?	5,3%	2,6%	22,4%	28,9%	40,8%	100,0%
		% of Total	0,9%	0,5%	3,9%	5,0%	7,0%	17,2%
	Samenwonend met partner, zonder kind(eren)	Count	13	29	53	69	51	215
		Expected Count	16,1	25,8	60,0	66,3	46,8	215,0
		% within Wat is uw huishoud samenstelling?	6,0%	13,5%	24,7%	32,1%	23,7%	100,0%
		% of Total	2,9%	6,6%	12,0%	15,6%	11,6%	48,8%
	Samenwonend met partner, met kind(eren) + Eenoudergezin	Count	16	22	53	45	14	150
		Expected Count	11,2	18,0	41,8	46,3	32,7	150,0
		% within Wat is uw huishoud samenstelling?	10,7%	14,7%	35,3%	30,0%	9,3%	100,0%
		% of Total	3,6%	5,0%	12,0%	10,2%	3,2%	34,0%
Total		Count	33	53	123	136	96	441
		Expected Count	33,0	53,0	123,0	136,0	96,0	441,0
		% within Wat is uw huishoud samenstelling?	7,5%	12,0%	27,9%	30,8%	21,8%	100,0%
		% of Total	7,5%	12,0%	27,9%	30,8%	21,8%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	38,473[a]	8	<,001
Likelihood Ratio	41,060	8	<,001
N of Valid Cases	441		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 5,69.

After combining the categories 'single-parent family' and 'cohabiting with partner, with children', 0.0% of the cells have an expected count less than five, wherewith this condition is met. Since the asymptotic significance is < 0.05, H0 is rejected.

Bivariate analysis: gender versus age

Tot welke leeftijdscategorie behoort u? * Met welk geslacht identificeert u zichzelf? Crosstabulation

			Met welk geslacht identificeert u zichzelf?		
			Man + Anders / zeg ik liever niet	Vrouw	Total
Tot welke leeftijdscategorie behoort u?	≤ 49 jaar	Count	61	26	87
		Expected Count	53,3	33,7	87,0
		% within Tot welke leeftijdscategorie behoort u?	70,1%	29,9%	100,0%
		% of Total	13,8%	5,9%	19,7%
	50 – 65 jaar	Count	126	91	217
		Expected Count	132,9	84,1	217,0
		% within Tot welke leeftijdscategorie behoort u?	58,1%	41,9%	100,0%
		% of Total	28,6%	20,6%	49,2%
	≥ 66 jaar	Count	83	54	137
		Expected Count	83,9	53,1	137,0
		% within Tot welke leeftijdscategorie behoort u?	60,6%	39,4%	100,0%
		% of Total	18,8%	12,2%	31,1%
Total		Count	270	171	441
		Expected Count	270,0	171,0	441,0
		% within Tot welke leeftijdscategorie behoort u?	61,2%	38,8%	100,0%
		% of Total	61,2%	38,8%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3,833[a]	2	,147
Likelihood Ratio	3,927	2	,140
N of Valid Cases	441		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 33,73.

The threshold value for e_i is below 20.0% wherewith this condition is met. Taking a 95% confidence level into account, the asymptotic significance value is larger than 0.05 and so H0 is accepted.

Bivariate analysis: gender versus education level

Wat is uw hoogst behaalde opleiding? * Met welk geslacht identificeert u zichzelf? Crosstabulation

			Met welk geslacht identificeert u zichzelf?		
			Man + Anders / zeg ik liever niet	Vrouw	Total
Wat is uw hoogst behaalde opleiding?	Basisschool, Middelbare school, LBO	Count	11	9	20
		Expected Count	12,2	7,8	20,0
		% within Wat is uw hoogst behaalde opleiding?	55,0%	45,0%	100,0%
		% of Total	2,5%	2,0%	4,5%
	Middelbaar beroepsonderwijs	Count	52	34	86
		Expected Count	52,7	33,3	86,0
		% within Wat is uw hoogst behaalde opleiding?	60,5%	39,5%	100,0%
		% of Total	11,8%	7,7%	19,5%
	Bachelor (HBO of universiteit)	Count	117	91	208
		Expected Count	127,3	80,7	208,0
		% within Wat is uw hoogst behaalde opleiding?	56,3%	43,8%	100,0%
		% of Total	26,5%	20,6%	47,2%
	Master of doctoraal	Count	90	37	127
		Expected Count	77,8	49,2	127,0
		% within Wat is uw hoogst behaalde opleiding?	70,9%	29,1%	100,0%
		% of Total	20,4%	8,4%	28,8%

Total	Count	270	171	441
	Expected Count	270,0	171,0	441,0
	% within Wat is uw hoogst behaalde opleiding?	61,2%	38,8%	100,0%
	% of Total	61,2%	38,8%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7,488[a]	3	,058
Likelihood Ratio	7,649	3	,054
N of Valid Cases	441		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 7,76.

The threshold value for the expected count is below 20.0% wherewith this condition is met. Since the asymptotic significance value is larger than 0.05, H0 is accepted.

Bivariate analysis: gender versus household composition

Wat is uw huishoud samenstelling? * Met welk geslacht identificeert u zichzelf? Crosstabulation

			Met welk geslacht identificeert u zichzelf?		
			Man + Anders / zeg ik liever niet	Vrouw	Total
Wat is uw huishoud samenstelling?	Alleenstaand	Count	27	49	76
		Expected Count	46,5	29,5	76,0
		% within Wat is uw huishoud samenstelling?	35,5%	64,5%	100,0%
		% of Total	6,1%	11,1%	17,2%
	Samenwonend met partner, zonder kind(eren)	Count	139	76	215
		Expected Count	131,6	83,4	215,0
		% within Wat is uw huishoud samenstelling?	64,7%	35,3%	100,0%
		% of Total	31,5%	17,2%	48,8%
	Samenwonend met partner, met kind(eren) + Eenoudergezin	Count	104	46	150
		Expected Count	91,8	58,2	150,0
		% within Wat is uw huishoud samenstelling?	69,3%	30,7%	100,0%
		% of Total	23,6%	10,4%	34,0%
Total		Count	270	171	441
		Expected Count	270,0	171,0	441,0
		% within Wat is uw huishoud samenstelling?	61,2%	38,8%	100,0%
		% of Total	61,2%	38,8%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	26,359[a]	2	<,001
Likelihood Ratio	25,801	2	<,001
N of Valid Cases	441		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 29,47.

Also here, the threshold value for e_i is below 20.0% wherewith this condition is met. Assuming a 95% confidence level, H0 is rejected.

Bivariate analysis: age versus education level

Wat is uw hoogst behaalde opleiding? * Tot welke leeftijdscategorie behoort u? Crosstabulation

			Tot welke leeftijdscategorie behoort u?			
			≤ 49 jaar	50 – 65 jaar	≥ 66 jaar	Total
Wat is uw hoogst behaalde opleiding?	Basisschool, Middelbare school, LBO	Count	1	8	11	20
		Expected Count	3,9	9,8	6,2	20,0
		% within Wat is uw hoogst behaalde opleiding?	5,0%	40,0%	55,0%	100,0%
		% of Total	0,2%	1,8%	2,5%	4,5%

	Middelbaar beroepsonderwijs	Count	8	41	37	86
		Expected Count	17,0	42,3	26,7	86,0
		% within Wat is uw hoogst behaalde opleiding?	9,3%	47,7%	43,0%	100,0%
		% of Total	1,8%	9,3%	8,4%	19,5%
	Bachelor (HBO of universiteit)	Count	41	101	66	208
		Expected Count	41,0	102,3	64,6	208,0
		% within Wat is uw hoogst behaalde opleiding?	19,7%	48,6%	31,7%	100,0%
		% of Total	9,3%	22,9%	15,0%	47,2%
	Master of doctoraal	Count	37	67	23	127
		Expected Count	25,1	62,5	39,5	127,0
		% within Wat is uw hoogst behaalde opleiding?	29,1%	52,8%	18,1%	100,0%
		% of Total	8,4%	15,2%	5,2%	28,8%
Total		Count	87	217	137	441
		Expected Count	87,0	217,0	137,0	441,0
		% within Wat is uw hoogst behaalde opleiding?	19,7%	49,2%	31,1%	100,0%
		% of Total	19,7%	49,2%	31,1%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	27,899[a]	6	<,001
Likelihood Ratio	29,391	6	<,001
N of Valid Cases	441		

a. 1 cells (8,3%) have expected count less than 5. The minimum expected count is 3,95.

Since only 8.3% of the cells have an expected count less than five, this percentage is below the threshold value of 20.0% wherewith this condition is met. Assuming a 95% confidence level, H0 is rejected as the asymptotic significance value is below 0.05.

Bivariate analysis: age versus household composition

Wat is uw huishoud samenstelling? * Tot welke leeftijdscategorie behoort u? Crosstabulation

			Tot welke leeftijdscategorie behoort u?			
			≤ 49 jaar	50 – 65 jaar	≥ 66 jaar	Total
Wat is uw huishoud samenstelling?	Alleenstaand	Count	10	37	29	76
		Expected Count	15,0	37,4	23,6	76,0
		% within Wat is uw huishoud samenstelling?	13,2%	48,7%	38,2%	100,0%
		% of Total	2,3%	8,4%	6,6%	17,2%
	Samenwonend met partner, zonder kind(eren)	Count	18	95	102	215
		Expected Count	42,4	105,8	66,8	215,0
		% within Wat is uw huishoud samenstelling?	8,4%	44,2%	47,4%	100,0%
		% of Total	4,1%	21,5%	23,1%	48,8%
	Samenwonend met partner, met kind(eren) + Eenoudergezin	Count	59	85	6	150
		Expected Count	29,6	73,8	46,6	150,0
		% within Wat is uw huishoud samenstelling?	39,3%	56,7%	4,0%	100,0%
		% of Total	13,4%	19,3%	1,4%	34,0%
Total		Count	87	217	137	441
		Expected Count	87,0	217,0	137,0	441,0
		% within Wat is uw huishoud samenstelling?	19,7%	49,2%	31,1%	100,0%
		% of Total	19,7%	49,2%	31,1%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	102,906[a]	4	<,001
Likelihood Ratio	118,931	4	<,001
N of Valid Cases	441		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 14,99.

The threshold value for the expected count is below 20.0% wherewith this condition is met. Since the asymptotic significance value is below 0.05, H0 is rejected.

Bivariate analysis: education level versus household composition

Wat is uw huishoud samenstelling? * Wat is uw hoogst behaalde opleiding? Crosstabulation

			Wat is uw hoogst behaalde opleiding?				
			Basisschool, Middelbare school, LBO	Middelbaar beroepsonderwijs	Bachelor (HBO of universiteit)	Master of doctoraal	Total
Wat is uw huishoud samenstelling?	Alleenstaand	Count	3	11	47	15	76
		Expected Count	3,4	14,8	35,8	21,9	76,0
		% within Wat is uw huishoud samenstelling?	3,9%	14,5%	61,8%	19,7%	100,0%
		% of Total	0,7%	2,5%	10,7%	3,4%	17,2%
	Samenwonend met partner, zonder kind(eren)	Count	13	51	101	50	215
		Expected Count	9,8	41,9	101,4	61,9	215,0
		% within Wat is uw huishoud samenstelling?	6,0%	23,7%	47,0%	23,3%	100,0%
		% of Total	2,9%	11,6%	22,9%	11,3%	48,8%
	Samenwonend met partner, met kind(eren) + Eenoudergezin	Count	4	24	60	62	150
		Expected Count	6,8	29,3	70,7	43,2	150,0
		% within Wat is uw huishoud samenstelling?	2,7%	16,0%	40,0%	41,3%	100,0%
		% of Total	0,9%	5,4%	13,6%	14,1%	34,0%
Total		Count	20	86	208	127	441
		Expected Count	20,0	86,0	208,0	127,0	441,0
		% within Wat is uw huishoud samenstelling?	4,5%	19,5%	47,2%	28,8%	100,0%
		% of Total	4,5%	19,5%	47,2%	28,8%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	23,937[a]	6	<,001
Likelihood Ratio	23,300	6	<,001
N of Valid Cases	441		

a. 1 cells (8,3%) have expected count less than 5. The minimum expected count is 3,45.

The threshold value for the expected count is below 20.0% wherewith this condition is met. Since the asymptotic significance value is smaller than 0.05, H0 is rejected.

H – RANK-ORDER LOGIT ANALYSIS TOTAL SAMPLE

Analysis without costs

```
------------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -6399.94190
Estimation based on N =   2646, K =  14
Inf.Cr.AIC  =  12827.9 AIC/N =    4.848
--------------------------------------
            Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
               Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
--------------------------------------
Response data are given as ind. choices
Number of obs.=  2646, skipped    0 obs
--------+---------------------------------------------------------------------
        |                   Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*         Interval
--------+---------------------------------------------------------------------
   ICST1|     .80434***      .12479     6.45  .0000      .55976   1.04893
   ICST2|     .28853**       .13485     2.14  .0324      .02423    .55283
   ICST3|     .42003***      .13189     3.18  .0014      .16153    .67852
   ICST4|    1.00720***      .12193     8.26  .0000      .76821   1.24618
   ICST5|    1.39529***      .11868    11.76  .0000     1.16269   1.62789
   ICST6|    1.09064***      .12164     8.97  .0000      .85224   1.32904
   ICST7|     .90760***      .12371     7.34  .0000      .66513   1.15006
   ICST8|     .95571***      .12201     7.83  .0000      .71657   1.19485
   ICST9|    -.49179***      .16053    -3.06  .0022     -.80643   -.17716
  ICST10|     .09122         .14077      .65  .5170     -.18468    .36712
  ICST11|     .60505***      .12748     4.75  .0000      .35520    .85490
  ICST12|    1.02291***      .12194     8.39  .0000      .78391   1.26192
  ICST13|     .71358***      .12547     5.69  .0000      .46767    .95950
  ICST14|     .25787*        .13505     1.91  .0562     -.00683    .52257
--------+---------------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 03:13:45 PM
------------------------------------------------------------------------------
```

Analysis with costs

```
------------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -6436.48266
Estimation based on N =   2646, K =  14
Inf.Cr.AIC  =  12901.0 AIC/N =    4.876
--------------------------------------
            Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
               Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
```

```
--------------------------------------
Response data are given as ind. choices
Number of obs.=  2646, skipped    0 obs
--------+-----------------------------------------------------------------
        |                  Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*         Interval
--------+-----------------------------------------------------------------
   ICST1|     .77750***      .13088     5.94  .0000      .52099   1.03401
   ICST2|     .65876***      .13339     4.94  .0000      .39731    .92020
   ICST3|     .69382***      .13286     5.22  .0000      .43341    .95423
   ICST4|    1.13685***      .12663     8.98  .0000      .88866   1.38504
   ICST5|    1.08678***      .12607     8.62  .0000      .83969   1.33387
   ICST6|    1.17725***      .12584     9.36  .0000      .93061   1.42390
   ICST7|    1.48895***      .12386    12.02  .0000     1.24619   1.73171
   ICST8|     .90997***      .12818     7.10  .0000      .65873   1.16120
   ICST9|     .34405**       .13952     2.47  .0137      .07060    .61751
  ICST10|     .02985         .15016      .20  .8424     -.26446    .32416
  ICST11|     .78363***      .13044     6.01  .0000      .52798   1.03928
  ICST12|     .72792***      .13175     5.53  .0000      .46970    .98613
  ICST13|    1.11887***      .12611     8.87  .0000      .87170   1.36603
  ICST14|     .03119         .14785      .21  .8329     -.25858    .32096
--------+-----------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 03:11:45 PM
--------------------------------------------------------------------------
```

I – RANKED-OREDERED LOGIT ANALYSIS SUB-GROUPS

Sub-group analysis on 'interest in co-housing' – Sub-group 1 without costs

```
Reject; jter = 2$
-----------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -2958.62982
Estimation based on N =   1254, K =  14
Inf.Cr.AIC  =   5945.3 AIC/N =    4.741
--------------------------------------
            Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
               Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
--------------------------------------
Response data are given as ind. choices
Number of obs.=  1254, skipped    0 obs
--------+--------------------------------------------------------------------
        |                   Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*          Interval
--------+--------------------------------------------------------------------
   ICST1|    1.46097***      .20777     7.03  .0000     1.05375   1.86819
   ICST2|     .68235***      .22596     3.02  .0025      .23948   1.12522
   ICST3|    1.23544***      .21187     5.83  .0000      .82018   1.65069
   ICST4|    1.30086***      .21079     6.17  .0000      .88772   1.71400
   ICST5|    2.10204***      .20208    10.40  .0000     1.70597   2.49811
   ICST6|    1.35415***      .20937     6.47  .0000      .94379   1.76451
   ICST7|    1.26250***      .21135     5.97  .0000      .84826   1.67675
   ICST8|    1.37209***      .20821     6.59  .0000      .96400   1.78017
   ICST9|     .12654         .24905      .51  .6114     -.36159    .61467
  ICST10|    -.15546         .26807     -.58  .5620     -.68087    .36995
  ICST11|     .82380***      .22060     3.73  .0002      .39144   1.25616
  ICST12|    1.96602***      .20231     9.72  .0000     1.56950   2.36254
  ICST13|    1.11588***      .21288     5.24  .0000      .69864   1.53312
  ICST14|    1.04780***      .21463     4.88  .0000      .62714   1.46846
--------+--------------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 03:34:02 PM
-----------------------------------------------------------------------------
```

Sub-group analysis on 'interest in co-housing' – Sub-group 2 without costs

```
Reject; jter = 1$
-----------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -3354.86167
Estimation based on N =   1392, K =  14
Inf.Cr.AIC  =   6737.7 AIC/N =    4.840
--------------------------------------
            Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
               Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
```

```
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
---------------------------------------
Response data are given as ind. choices
Number of obs.=  1392, skipped    0 obs
--------+------------------------------------------------------------------
        |                  Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*         Interval
--------+------------------------------------------------------------------
   ICST1|     .30729*        .16212     1.90  .0580     -.01047    .62504
   ICST2|     .03451         .17067      .20  .8398     -.30000    .36901
   ICST3|    -.28489         .18267    -1.56  .1189     -.64291    .07313
   ICST4|     .83363***      .15078     5.53  .0000      .53810   1.12916
   ICST5|     .87737***      .15042     5.83  .0000      .58255   1.17218
   ICST6|     .96757***      .15112     6.40  .0000      .67139   1.26375
   ICST7|     .69468***      .15462     4.49  .0000      .39164    .99773
   ICST8|     .69044***      .15293     4.51  .0000      .39071    .99018
   ICST9|    -.95716***      .22011    -4.35  .0000    -1.38857   -.52576
  ICST10|     .19579         .16632     1.18  .2391     -.13018    .52176
  ICST11|     .48857***      .15717     3.11  .0019      .18053    .79662
  ICST12|     .22106         .16398     1.35  .1776     -.10032    .54245
  ICST13|     .45907***      .15781     2.91  .0036      .14977    .76837
  ICST14|    -.43613**       .18975    -2.30  .0215     -.80804   -.06423
--------+------------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 03:37:39 PM
--------------------------------------------------------------------------
```

Sub-group analysis on 'interest in co-housing' – Sub-group 1 with costs

```
Reject; jter = 2$
--------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -3036.85880
Estimation based on N =   1254, K =  14
Inf.Cr.AIC  =   6101.7 AIC/N =    4.866
---------------------------------------
           Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
              Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
---------------------------------------
Response data are given as ind. choices
Number of obs.=  1254, skipped    0 obs
--------+------------------------------------------------------------------
        |                  Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*         Interval
--------+------------------------------------------------------------------
   ICST1|    1.42336***      .21853     6.51  .0000      .99505   1.85167
   ICST2|    1.13943***      .22497     5.06  .0000      .69849   1.58036
   ICST3|    1.48708***      .21793     6.82  .0000     1.05994   1.91422
   ICST4|    1.47507***      .21897     6.74  .0000     1.04590   1.90424
   ICST5|    1.67964***      .21418     7.84  .0000     1.25985   2.09943
   ICST6|    1.47285***      .21800     6.76  .0000     1.04558   1.90013
   ICST7|    1.75507***      .21529     8.15  .0000     1.33312   2.17702
   ICST8|    1.32072***      .21942     6.02  .0000      .89067   1.75078
   ICST9|     .98947***      .22791     4.34  .0000      .54277   1.43617
```

```
  ICST10|    -.03462         .27492     -.13  .8998     -.57346    .50423
  ICST11|    1.03866***      .22652     4.59  .0000      .59469   1.48263
  ICST12|    1.62306***      .21569     7.52  .0000     1.20031   2.04581
  ICST13|    1.53829***      .21679     7.10  .0000     1.11339   1.96318
  ICST14|     .82302***      .23146     3.56  .0004      .36937   1.27667
--------+------------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 03:40:14 PM
--------------------------------------------------------------------------
```

Sub-group analysis on 'interest in co-housing' – Sub-group 2 with costs

```
Reject; jter = 1$
--------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -3335.29276
Estimation based on N =   1392, K =  14
Inf.Cr.AIC  =   6698.6 AIC/N =    4.812
-----------------------------------------
           Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
              Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
-----------------------------------------
Response data are given as ind. choices
Number of obs.=  1392, skipped    0 obs
--------+-----------------------------------------------------------------
        |                  Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*          Interval
--------+-----------------------------------------------------------------
   ICST1|     .29495*        .16994     1.74  .0826     -.03813    .62802
   ICST2|     .33758**       .16916     2.00  .0460      .00604    .66912
   ICST3|     .03044         .17971      .17  .8655     -.32179    .38267
   ICST4|     .93733***      .15689     5.97  .0000      .62983   1.24483
   ICST5|     .66256***      .16033     4.13  .0000      .34832    .97680
   ICST6|    1.02131***      .15572     6.56  .0000      .71611   1.32652
   ICST7|    1.35894***      .15311     8.88  .0000     1.05886   1.65903
   ICST8|     .65468***      .16041     4.08  .0000      .34027    .96908
   ICST9|    -.14094         .18479     -.76  .4456     -.50312    .22124
  ICST10|     .05964         .17952      .33  .7397     -.29222    .41150
  ICST11|     .64430***      .16062     4.01  .0001      .32950    .95910
  ICST12|    -.06150         .18170     -.34  .7350     -.41763    .29463
  ICST13|     .85359***      .15734     5.43  .0000      .54521   1.16197
  ICST14|    -.67004***      .21245    -3.15  .0016    -1.08644   -.25365
--------+-----------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 03:42:40 PM
--------------------------------------------------------------------------
```

Sub-group analysis on 'income' – Sub-group 1 without costs

```
Reject; jinc = 2 | jinc = 0$
--------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -2261.74549
Estimation based on N =    954, K =  14
```

```
Inf.Cr.AIC  =   4551.5 AIC/N =    4.771
--------------------------------------
           Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
              Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
--------------------------------------
Response data are given as ind. choices
Number of obs.=   954, skipped    0 obs
--------+-----------------------------------------------------------------
        |                  Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*         Interval
--------+-----------------------------------------------------------------
   ICST1|     .34930*        .19487     1.79  .0731     -.03263    .73123
   ICST2|    -.30298         .22170    -1.37  .1717     -.73750    .13153
   ICST3|    -.37012         .22513    -1.64  .1002     -.81137    .07113
   ICST4|     .71436***      .18582     3.84  .0001      .35016   1.07856
   ICST5|    1.00722***      .18023     5.59  .0000      .65397   1.36046
   ICST6|     .95644***      .18126     5.28  .0000      .60118   1.31171
   ICST7|     .89968***      .18277     4.92  .0000      .54145   1.25791
   ICST8|     .94356***      .17907     5.27  .0000      .59259   1.29454
   ICST9|    -.93712***      .26392    -3.55  .0004    -1.45439   -.41986
  ICST10|     .01477         .20707      .07  .9431     -.39108    .42061
  ICST11|     .34619*        .19327     1.79  .0733     -.03263    .72500
  ICST12|     .29153         .19596     1.49  .1368     -.09255    .67562
  ICST13|     .43179**        .19061     2.27  .0235      .05820    .80538
  ICST14|    -.71627***      .24599    -2.91  .0036    -1.19839   -.23414
--------+-----------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 04:23:16 PM
----------------------------------------------------------------------------
```

Sub-group analysis on 'income' – Sub-group 2 without costs

```
Reject; jinc = 1 | jinc = 0$
----------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -3447.92466
Estimation based on N =   1434, K =  14
Inf.Cr.AIC  =   6923.8 AIC/N =    4.828
--------------------------------------
           Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
              Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
--------------------------------------
Response data are given as ind. choices
Number of obs.=  1434, skipped    0 obs
--------+-----------------------------------------------------------------
        |                  Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*         Interval
--------+-----------------------------------------------------------------
   ICST1|    1.18528***      .18485     6.41  .0000      .82298   1.54759
   ICST2|     .76673***      .19381     3.96  .0001      .38687   1.14659
```

```
   ICST3|     .99257***      .18866     5.26  .0000      .62280   1.36233
   ICST4|    1.30935***      .18263     7.17  .0000      .95140   1.66730
   ICST5|    1.76406***      .17843     9.89  .0000     1.41435   2.11378
   ICST6|    1.28783***      .18400     7.00  .0000      .92720   1.64846
   ICST7|    1.00021***      .18868     5.30  .0000      .63040   1.37002
   ICST8|    1.09540***      .18601     5.89  .0000      .73082   1.45997
   ICST9|    -.19860         .23168     -.86  .3913     -.65269    .25548
  ICST10|     .15323         .21642      .71  .4789     -.27095    .57741
  ICST11|     .80972***      .19189     4.22  .0000      .43362   1.18583
  ICST12|    1.57423***      .17974     8.76  .0000     1.22195   1.92652
  ICST13|     .92546***      .18904     4.90  .0000      .55496   1.29597
  ICST14|     .84305***      .19128     4.41  .0000      .46815   1.21796
--------+------------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 04:24:38 PM
-----------------------------------------------------------------------------
```

Sub-group analysis on 'income' – Sub-group 1 with costs

```
Reject; jinc = 2 | jinc = 0$
-----------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -2265.66884
Estimation based on N =    954, K =  14
Inf.Cr.AIC  =   4559.3 AIC/N =    4.779
--------------------------------------
            Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
               Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
--------------------------------------
Response data are given as ind. choices
Number of obs.=   954, skipped    0 obs
--------+--------------------------------------------------------------------
        |                   Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*         Interval
--------+--------------------------------------------------------------------
   ICST1|     .20685         .20844      .99  .3210     -.20170    .61539
   ICST2|     .06241         .21551      .29  .7721     -.35998    .48480
   ICST3|     .00102         .21656      .00  .9962     -.42342    .42547
   ICST4|     .84632***      .19090     4.43  .0000      .47216   1.22048
   ICST5|     .75493***      .19145     3.94  .0001      .37969   1.13016
   ICST6|    1.01603***      .18823     5.40  .0000      .64711   1.38495
   ICST7|    1.44141***      .18456     7.81  .0000     1.07969   1.80314
   ICST8|     .86840***      .18808     4.62  .0000      .49976   1.23703
   ICST9|     .01110         .21532      .05  .9589     -.41092    .43312
  ICST10|    -.06338         .22155     -.29  .7748     -.49761    .37085
  ICST11|     .62279***      .19441     3.20  .0014      .24176   1.00382
  ICST12|    -.07439         .22029     -.34  .7356     -.50616    .35738
  ICST13|     .90504***      .18858     4.80  .0000      .53542   1.27465
  ICST14|    -.82229***      .26769    -3.07  .0021    -1.34695   -.29764
--------+--------------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 04:26:05 PM
-----------------------------------------------------------------------------
```

Sub-group analysis on 'income' – Sub-group 2 with costs

```
Reject; jinc = 1 | jinc = 0$
--------------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -3495.20752
Estimation based on N =   1434, K =  14
Inf.Cr.AIC  =   7018.4 AIC/N =    4.894
----------------------------------------
           Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
              Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
----------------------------------------
Response data are given as ind. choices
Number of obs.=  1434, skipped    0 obs
--------+-----------------------------------------------------------------------
        |                  Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*         Interval
--------+-----------------------------------------------------------------------
   ICST1|    1.15729***      .18959     6.10  .0000      .78570   1.52889
   ICST2|    1.06646***      .19180     5.56  .0000      .69054   1.44239
   ICST3|    1.18013***      .19020     6.20  .0000      .80733   1.55292
   ICST4|    1.39075***      .18703     7.44  .0000     1.02418   1.75732
   ICST5|    1.34787***      .18585     7.25  .0000      .98361   1.71214
   ICST6|    1.34776***      .18655     7.22  .0000      .98213   1.71339
   ICST7|    1.53889***      .18510     8.31  .0000     1.17610   1.90168
   ICST8|     .99465***      .19220     5.18  .0000      .61794   1.37136
   ICST9|     .54888***      .20462     2.68  .0073      .14783    .94994
  ICST10|     .08737         .22542      .39  .6983     -.35444    .52919
  ICST11|     .87663***      .19491     4.50  .0000      .49460   1.25865
  ICST12|    1.21349***      .18857     6.44  .0000      .84390   1.58308
  ICST13|    1.27669***      .18754     6.81  .0000      .90911   1.64427
  ICST14|     .52342**       .20457     2.56  .0105      .12247    .92437
--------+-----------------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 04:26:57 PM
--------------------------------------------------------------------------------
```

Sub-group analysis on 'disposal of common facilities' – Sub-group 1 without costs

```
Reject; jcom = 2$
--------------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -5512.52219
Estimation based on N =   2286, K =  14
Inf.Cr.AIC  =  11053.0 AIC/N =    4.835
----------------------------------------
           Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
              Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
----------------------------------------
```

```
Response data are given as ind. choices
Number of obs.=  2286, skipped    0 obs
--------+------------------------------------------------------------------
        |                 Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*          Interval
--------+------------------------------------------------------------------
   ICST1|    1.05768***      .14203     7.45  .0000       .77931   1.33605
   ICST2|     .56051***      .15129     3.70  .0002       .26399    .85704
   ICST3|     .67170***      .14896     4.51  .0000       .37975    .96365
   ICST4|    1.20826***      .13996     8.63  .0000       .93395   1.48257
   ICST5|    1.59982***      .13658    11.71  .0000      1.33213   1.86751
   ICST6|    1.17969***      .14091     8.37  .0000       .90351   1.45587
   ICST7|    1.15558***      .14105     8.19  .0000       .87913   1.43204
   ICST8|    1.15105***      .14001     8.22  .0000       .87662   1.42547
   ICST9|    -.36666**       .18327    -2.00  .0454      -.72587   -.00745
  ICST10|     .20723         .16163     1.28  .1998      -.10955    .52402
  ICST11|     .78233***      .14600     5.36  .0000       .49618   1.06848
  ICST12|    1.30453***      .13897     9.39  .0000      1.03216   1.57690
  ICST13|     .96515***      .14268     6.76  .0000       .68550   1.24480
  ICST14|     .54778***      .15104     3.63  .0003       .25174    .84382
--------+------------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 04:09:40 PM
-------------------------------------------------------------------------------
```

Sub-group analysis on 'disposal of common facilities' – Sub-group 2 without costs

```
Reject; jcom = 1$
-------------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function      -849.18215
Estimation based on N =    360, K =  14
Inf.Cr.AIC  =   1726.4 AIC/N =    4.795
-------------------------------------
           Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
               Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
-------------------------------------
Response data are given as ind. choices
Number of obs.=   360, skipped    0 obs
--------+------------------------------------------------------------------
        |                 Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*          Interval
--------+------------------------------------------------------------------
   ICST1|     -.44503        .29483    -1.51  .1312    -1.02289    .13283
   ICST2|   -1.16029***      .36021    -3.22  .0013    -1.86629   -.45428
   ICST3|    -.82670**       .32495    -2.54  .0110    -1.46360   -.18980
   ICST4|     .11457         .26466      .43  .6651     -.40415    .63329
   ICST5|     .49199*        .25524     1.93  .0539     -.00826    .99225
   ICST6|     .87014***      .24883     3.50  .0005      .38244   1.35785
   ICST7|    -.30017         .28767    -1.04  .2967     -.86400    .26366
   ICST8|     .11214         .26496      .42  .6721     -.40718    .63145
   ICST9|    -.99985***      .33995    -2.94  .0033    -1.66614   -.33355
  ICST10|    -.34370         .29306    -1.17  .2409     -.91810    .23069
  ICST11|    -.14829         .27554     -.54  .5905     -.68834    .39177
  ICST12|    -.44294         .29476    -1.50  .1329    -1.02066    .13478
```

```
  ICST13|    -.52880*        .29800    -1.77  .0760    -1.11286    .05526
  ICST14|   -1.38787***      .38701    -3.59  .0003    -2.14639   -.62935
--------+------------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 04:10:58 PM
--------------------------------------------------------------------------
```

Sub-group analysis on 'disposal of common facilities' – Sub-group 1 with costs

```
Reject; jcom = 2$
--------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -5551.50587
Estimation based on N =   2286, K =  14
Inf.Cr.AIC  =  11131.0 AIC/N =    4.869
--------------------------------------
            Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
               Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
--------------------------------------
Response data are given as ind. choices
Number of obs.=  2286, skipped    0 obs
--------+------------------------------------------------------------------
        |                 Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*         Interval
--------+------------------------------------------------------------------
   ICST1|    1.00138***      .14869     6.73  .0000      .70995   1.29282
   ICST2|     .90162***      .15090     5.98  .0000      .60586   1.19737
   ICST3|     .93236***      .15082     6.18  .0000      .63676   1.22796
   ICST4|    1.32844***      .14510     9.16  .0000     1.04405   1.61284
   ICST5|    1.26144***      .14468     8.72  .0000      .97787   1.54501
   ICST6|    1.26742***      .14535     8.72  .0000      .98254   1.55230
   ICST7|    1.69039***      .14210    11.90  .0000     1.41187   1.96890
   ICST8|    1.10283***      .14650     7.53  .0000      .81570   1.38996
   ICST9|     .52262***      .15835     3.30  .0010      .21227    .83297
  ICST10|     .11989         .17257      .69  .4872     -.21834    .45813
  ICST11|     .92265***      .14989     6.16  .0000      .62887   1.21642
  ICST12|    1.02766***      .14833     6.93  .0000      .73693   1.31838
  ICST13|    1.36845***      .14389     9.51  .0000     1.08643   1.65048
  ICST14|     .33658**       .16302     2.06  .0390      .01705    .65610
--------+------------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 04:11:59 PM
--------------------------------------------------------------------------
```

Sub-group analysis on 'disposal of common facilities' – Sub-group 2 with costs

```
Reject; jcom = 1$
--------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function      -847.25600
Estimation based on N =    360, K =  14
Inf.Cr.AIC  =   1722.5 AIC/N =    4.785
--------------------------------------
            Log likelihood R-sqrd R2Adj
```

```
ASCs  only  model must be fit separately
              Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
---------------------------------------
Response data are given as ind. choices
Number of obs.=   360, skipped    0 obs
--------+------------------------------------------------------------------
        |                  Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*          Interval
--------+------------------------------------------------------------------
   ICST1|    -.28747         .30587     -.94  .3473     -.88697    .31202
   ICST2|    -.55769*        .32525    -1.71  .0864    -1.19517    .07979
   ICST3|    -.44211         .30933    -1.43  .1529    -1.04838    .16416
   ICST4|     .29101         .27462     1.06  .2893     -.24723    .82925
   ICST5|     .35420         .26980     1.31  .1892     -.17460    .88300
   ICST6|     .95079***      .25878     3.67  .0002      .44358   1.45800
   ICST7|     .58658**       .26944     2.18  .0295      .05848   1.11467
   ICST8|     .06712         .28338      .24  .8128     -.48829    .62253
   ICST9|    -.41676         .31453    -1.33  .1852    -1.03322    .19970
  ICST10|    -.29917         .30922     -.97  .3333     -.90522    .30689
  ICST11|     .22982         .27329      .84  .4004     -.30582    .76546
  ICST12|   -1.08502***      .37815    -2.87  .0041    -1.82618   -.34386
  ICST13|    -.11595         .29106     -.40  .6904     -.68642    .45452
  ICST14|   -2.05519***      .54105    -3.80  .0001    -3.11564   -.99475
--------+------------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 04:13:07 PM
----------------------------------------------------------------------------
```

Sub-group analysis on 'household composition' – Sub-group 1 without costs

```
Reject; jhhc = 2$
----------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -4193.98684
Estimation based on N =   1746, K =  14
Inf.Cr.AIC  =   8416.0 AIC/N =    4.820
---------------------------------------
           Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
              Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
---------------------------------------
Response data are given as ind. choices
Number of obs.=  1746, skipped    0 obs
--------+------------------------------------------------------------------
        |                  Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*          Interval
--------+------------------------------------------------------------------
   ICST1|     .71601***      .14973     4.78  .0000      .42255   1.00947
   ICST2|     .09478         .16583      .57  .5676     -.23023    .41979
   ICST3|     .03469         .16789      .21  .8363     -.29436    .36374
   ICST4|     .97632***      .14553     6.71  .0000      .69108   1.26156
   ICST5|    1.34872***      .14170     9.52  .0000     1.07100   1.62644
```

```
   ICST6|    1.14308***       .14436     7.92   .0000       .86013    1.42603
   ICST7|     .86401***       .14779     5.85   .0000       .57435    1.15366
   ICST8|     .91707***       .14556     6.30   .0000       .63178    1.20236
   ICST9|    -.60036***       .19603    -3.06   .0022      -.98458    -.21614
  ICST10|     .09238          .16667      .55   .5794      -.23428     .41904
  ICST11|     .58339***       .15203     3.84   .0001       .28541     .88136
  ICST12|     .71611***       .14997     4.77   .0000       .42217    1.01005
  ICST13|     .70477***       .14919     4.72   .0000       .41237     .99718
  ICST14|     .00318          .16843      .02   .9849      -.32693     .33329
--------+------------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 04:16:37 PM
-----------------------------------------------------------------------------
```

Sub-group analysis on 'household composition' – Sub-group 2 without costs

```
Reject; jhhc = 1$
-----------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -2172.54612
Estimation based on N =    900, K =  14
Inf.Cr.AIC  =   4373.1 AIC/N =    4.859
--------------------------------------
           Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
              Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
--------------------------------------
Response data are given as ind. choices
Number of obs.=   900, skipped    0 obs
--------+--------------------------------------------------------------------
        |                 Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*         Interval
--------+--------------------------------------------------------------------
   ICST1|     .99368***       .22669     4.38   .0000       .54938    1.43799
   ICST2|     .66464***       .23599     2.82   .0049       .20211    1.12717
   ICST3|    1.07157***       .22490     4.76   .0000       .63077    1.51236
   ICST4|    1.08320***       .22382     4.84   .0000       .64453    1.52188
   ICST5|    1.49994***       .21770     6.89   .0000      1.07326    1.92662
   ICST6|    1.00067***       .22638     4.42   .0000       .55698    1.44436
   ICST7|    1.01070***       .22665     4.46   .0000       .56647    1.45492
   ICST8|    1.04749***       .22413     4.67   .0000       .60819    1.48679
   ICST9|    -.26337          .28174     -.93   .3499      -.81557     .28883
  ICST10|     .08633          .26307      .33   .7428      -.42928     .60194
  ICST11|     .66268***       .23426     2.83   .0047       .20354    1.12183
  ICST12|    1.59782***       .21568     7.41   .0000      1.17509    2.02056
  ICST13|     .73766***       .23213     3.18   .0015       .28268    1.19263
  ICST14|     .72557***       .23294     3.11   .0018       .26902    1.18211
--------+--------------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 04:17:33 PM
-----------------------------------------------------------------------------
```

Sub-group analysis on 'household composition' – Sub-group 1 with costs

```
Reject; jhhc = 2$
-------------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -4218.63190
Estimation based on N =   1746, K =  14
Inf.Cr.AIC  =   8465.3 AIC/N =    4.848
-----------------------------------------
            Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
               Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
-----------------------------------------
Response data are given as ind. choices
Number of obs.=  1746, skipped    0 obs
--------+----------------------------------------------------------------------
        |                  Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*         Interval
--------+----------------------------------------------------------------------
   ICST1|     .59777***      .15540     3.85  .0001      .29320    .90235
   ICST2|     .40072**       .16054     2.50  .0126      .08606    .71537
   ICST3|     .28665*        .16384     1.75  .0802     -.03447    .60777
   ICST4|    1.06245***      .14815     7.17  .0000      .77209   1.35282
   ICST5|    1.01659***      .14768     6.88  .0000      .72714   1.30603
   ICST6|    1.13084***      .14682     7.70  .0000      .84307   1.41860
   ICST7|    1.38141***      .14541     9.50  .0000     1.09641   1.66642
   ICST8|     .76187***      .15111     5.04  .0000      .46570   1.05804
   ICST9|     .27529*        .16336     1.69  .0920     -.04489    .59547
  ICST10|    -.02707         .17580     -.15  .8776     -.37163    .31749
  ICST11|     .76450***      .15148     5.05  .0000      .46760   1.06139
  ICST12|     .39966**       .16057     2.49  .0128      .08495    .71437
  ICST13|    1.01040***      .14774     6.84  .0000      .72083   1.29997
  ICST14|    -.34223*        .18676    -1.83  .0669     -.70827    .02382
--------+----------------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 04:18:34 PM
-------------------------------------------------------------------------------
```

Sub-group analysis on 'household composition' – Sub-group 2 with costs

```
Reject; jhhc = 1$
-------------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -2186.76606
Estimation based on N =    900, K =  14
Inf.Cr.AIC  =   4401.5 AIC/N =    4.891
-----------------------------------------
            Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
               Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
-----------------------------------------
```

```
Response data are given as ind. choices
Number of obs.=   900, skipped    0 obs
--------+------------------------------------------------------------------
        |                   Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*          Interval
--------+------------------------------------------------------------------
   ICST1|    1.18220***      .24800     4.77  .0000       .69613   1.66827
   ICST2|    1.20087***      .24854     4.83  .0000       .71373   1.68801
   ICST3|    1.46245***      .24341     6.01  .0000       .98537   1.93952
   ICST4|    1.33369***      .24593     5.42  .0000       .85168   1.81570
   ICST5|    1.28286***      .24433     5.25  .0000       .80399   1.76173
   ICST6|    1.31887***      .24571     5.37  .0000       .83728   1.80046
   ICST7|    1.75715***      .23939     7.34  .0000      1.28796   2.22634
   ICST8|    1.25561***      .24565     5.11  .0000       .77414   1.73708
   ICST9|     .52327*        .26968     1.94  .0523      -.00529   1.05184
  ICST10|     .18084         .28996      .62  .5328      -.38747    .74914
  ICST11|     .84865***      .25717     3.30  .0010       .34460   1.35271
  ICST12|    1.36824***      .24340     5.62  .0000       .89118   1.84531
  ICST13|    1.38365***      .24426     5.66  .0000       .90491   1.86238
  ICST14|     .71720***      .26059     2.75  .0059       .20645   1.22795
--------+------------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 04:19:44 PM
--------------------------------------------------------------------------------
```

Sub-group analysis on 'urbanization degree living area' – Sub-group 1 without costs

```
Reject; jurb = 2$
--------------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -2860.41234
Estimation based on N =   1194, K =  14
Inf.Cr.AIC  =   5748.8 AIC/N =    4.815
-----------------------------------------
           Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
               Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
-----------------------------------------
Response data are given as ind. choices
Number of obs.=  1194, skipped    0 obs
--------+------------------------------------------------------------------
        |                   Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*          Interval
--------+------------------------------------------------------------------
   ICST1|    1.01047***      .19127     5.28  .0000       .63559   1.38535
   ICST2|     .21455         .21508     1.00  .3185      -.20701    .63611
   ICST3|     .58834***      .20272     2.90  .0037       .19102    .98567
   ICST4|    1.20538***      .18811     6.41  .0000       .83670   1.57406
   ICST5|    1.53559***      .18420     8.34  .0000      1.17456   1.89663
   ICST6|    1.29980***      .18763     6.93  .0000       .93204   1.66755
   ICST7|    1.11067***      .19033     5.84  .0000       .73763   1.48371
   ICST8|    1.12605***      .18826     5.98  .0000       .75706   1.49504
   ICST9|    -.69947***      .27093    -2.58  .0098     -1.23047   -.16846
  ICST10|     .20063         .21693      .92  .3550      -.22455    .62581
  ICST11|     .89446***      .19279     4.64  .0000       .51659   1.27233
  ICST12|    1.01344***      .19124     5.30  .0000       .63862   1.38827
```

```
  ICST13|     .80970***      .19526     4.15  .0000      .42699   1.19241
  ICST14|     .40165*        .20846     1.93  .0540     -.00693    .81023
--------+------------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 03:57:13 PM
-----------------------------------------------------------------------------
```

Sub-group analysis on 'urbanization degree living area' – Sub-group 2 without costs

```
Reject; jurb = 1$
-----------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -3528.73348
Estimation based on N =   1452, K =  14
Inf.Cr.AIC  =   7085.5 AIC/N =    4.880
--------------------------------------
            Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
               Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
--------------------------------------
Response data are given as ind. choices
Number of obs.=  1452, skipped    0 obs
--------+------------------------------------------------------------------
        |                  Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*         Interval
--------+------------------------------------------------------------------
   ICST1|     .64079***      .16549     3.87  .0001      .31644    .96514
   ICST2|     .34150**       .17324     1.97  .0487      .00195    .68105
   ICST3|     .29115*        .17414     1.67  .0945     -.05016    .63246
   ICST4|     .85319***      .16066     5.31  .0000      .53830   1.16808
   ICST5|    1.28914***      .15547     8.29  .0000      .98442   1.59385
   ICST6|     .92698***      .16030     5.78  .0000      .61280   1.24116
   ICST7|     .74887***      .16341     4.58  .0000      .42859   1.06915
   ICST8|     .82440***      .16072     5.13  .0000      .50939   1.13940
   ICST9|    -.37640*        .20032    -1.88  .0602     -.76902    .01621
  ICST10|     .01002         .18530      .05  .9569     -.35316    .37319
  ICST11|     .36074**       .17180     2.10  .0357      .02402    .69746
  ICST12|    1.03758***      .15844     6.55  .0000      .72704   1.34812
  ICST13|     .64253***      .16390     3.92  .0001      .32130    .96376
  ICST14|     .14893         .17757      .84  .4016     -.19911    .49696
--------+------------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 03:58:56 PM
-----------------------------------------------------------------------------
```

Sub-group analysis on 'urbanization degree living area' – Sub-group 1 with costs

```
Reject; jurb = 2$
-----------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -2879.68473
Estimation based on N =   1194, K =  14
Inf.Cr.AIC  =   5787.4 AIC/N =    4.847
--------------------------------------
```

```
            Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
               Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
---------------------------------------
Response data are given as ind. choices
Number of obs.=  1194, skipped    0 obs
--------+------------------------------------------------------------------
        |                   Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*          Interval
--------+------------------------------------------------------------------
   ICST1|     .93929***      .20005     4.70  .0000       .54720   1.33137
   ICST2|     .69354***      .20624     3.36  .0008       .28931   1.09777
   ICST3|     .79235***      .20442     3.88  .0001       .39169   1.19301
   ICST4|    1.27033***      .19468     6.53  .0000       .88876   1.65190
   ICST5|    1.25708***      .19366     6.49  .0000       .87751   1.63664
   ICST6|    1.32721***      .19376     6.85  .0000       .94745   1.70698
   ICST7|    1.66370***      .19056     8.73  .0000      1.29021   2.03719
   ICST8|    1.00132***      .19802     5.06  .0000       .61321   1.38944
   ICST9|     .37268*        .21643     1.72  .0851      -.05152    .79687
  ICST10|     .11174         .23003      .49  .6271      -.33912    .56260
  ICST11|    1.04191***      .19738     5.28  .0000       .65505   1.42876
  ICST12|     .69817***      .20626     3.38  .0007       .29391   1.10244
  ICST13|    1.24056***      .19448     6.38  .0000       .85939   1.62173
  ICST14|    -.01665         .23446     -.07  .9434      -.47618    .44289
--------+------------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 04:00:19 PM
-----------------------------------------------------------------------------
```

Sub-group analysis on 'urbanization degree living area' – Sub-group 2 with costs

```
Reject; jurb = 1$
-----------------------------------------------------------------------------
Discrete choice (multinomial logit) model
Dependent variable                Choice
Log likelihood function     -3550.60713
Estimation based on N =   1452, K =  14
Inf.Cr.AIC  =   7129.2 AIC/N =    4.910
---------------------------------------
            Log likelihood R-sqrd R2Adj
ASCs  only  model must be fit separately
               Use NLOGIT ;...;RHS=ONE$
Note: R-sqrd = 1 - logL/Logl(constants)
Warning:  Model does not contain a full
set of ASCs. R-sqrd is problematic. Use
model setup with ;RHS=one to get LogL0.
---------------------------------------
Response data are given as ind. choices
Number of obs.=  1452, skipped    0 obs
--------+------------------------------------------------------------------
        |                   Standard            Prob.      95% Confidence
    ICHO|  Coefficient       Error       z    |z|>Z*          Interval
--------+------------------------------------------------------------------
   ICST1|     .64907***      .17358     3.74  .0002       .30887    .98927
   ICST2|     .63686***      .17502     3.64  .0003       .29382    .97989
   ICST3|     .61918***      .17505     3.54  .0004       .27608    .96228
   ICST4|    1.03380***      .16706     6.19  .0000       .70637   1.36122
```

```
   ICST5|     .95288***      .16647     5.72  .0000      .62660   1.27916
   ICST6|    1.06112***      .16578     6.40  .0000      .73619   1.38606
   ICST7|    1.35148***      .16335     8.27  .0000     1.03132   1.67165
   ICST8|     .84134***      .16832     5.00  .0000      .51144   1.17125
   ICST9|     .32487*        .18256     1.78  .0752     -.03294    .68268
  ICST10|    -.03101         .19845     -.16  .8758     -.41996    .35795
  ICST11|     .56670***      .17514     3.24  .0012      .22343    .90996
  ICST12|     .75134***      .17128     4.39  .0000      .41564   1.08704
  ICST13|    1.02515***      .16587     6.18  .0000      .70004   1.35026
  ICST14|     .06064         .19059      .32  .7504     -.31292    .43419
--------+------------------------------------------------------------------
***, **, * ==>  Significance at 1%, 5%, 10% level.
Model was estimated on Feb 06, 2024 at 04:01:40 PM
-------------------------------------------------------------------------------
```

J – TABLES SUB-GROUP ANALYSIS

Coefficients per common facility, for total sample and sub-groups

Sub-groups based on interest in co-housing.

	Coefficients without costs			Coefficients with costs		
Common facility	Total sample	Sub-group 1	Sub-group 2	Total sample	Sub-group 1	Sub-group 2
Library room with workplaces	0.8043***	1.4609***	0.3072*	0.7775***	1.4233***	0.2949*
Outdoor kitchen with canopy	0.2885**	0.6823***	0.0345	0.6587***	1.1394***	0.3375**
Outdoor swimming pool	0.4200***	1.2354***	-0.2848	0.6938***	1.4870***	0.0304
Shared car service	1.0072***	1.3008***	0.8336***	1.1368***	1.4750***	0.9373***
Shared bike parking (indoor)	1.3952***	2.1020***	0.8773***	1.0867***	1.6796***	0.6625***
Garden with terrace	1.0906***	1.3541***	0.9675***	1.1772***	1.4728***	1.0213***
Vegetable garden w/ greenhouse	0.9076***	1.2625***	0.6946***	1.4889***	1.7550***	1.3589***
Hobby room / atelier	0.9557***	1.3720***	0.6904***	0.9099***	1.3207***	0.6546***
Jeu de boules court	-0.4917***	0.1265	-0.9571***	0.3440**	0.9894***	-0.1409
Kitchen with dining room	0.0912	-0.1554	0.1957	0.0298	-0.0346	0.0596
Guest room w/ private bathroom	0.6050***	0.8238***	0.4885***	0.7836***	1.0386***	0.6443***
Exercise room w/ sport equipment	1.0229***	1.9660***	0.2210	0.7279***	1.6230***	-0.0615
Laundry room	0.7135***	1.1158***	0.4590***	1.1188***	1.5382***	0.8535***
Wellness area	0.2578*	1.0478***	-0.4361**	0.0311	0.8230***	-0.6700***
Living room	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Coefficients per common facility, for total sample and sub-groups

Sub-groups based on income.

	Coefficients without costs			Coefficients with costs		
Common facility	Total sample	Sub-group 1	Sub-group 2	Total sample	Sub-group 1	Sub-group 2
Library room with workplaces	0.8043***	0.3493*	1.1852***	0.7775***	0.2068	1.1572***
Outdoor kitchen with canopy	0.2885**	-0.3029	0.7667***	0.6587***	0.0624	1.0664***
Outdoor swimming pool	0.4200***	-0.3701	0.9925***	0.6938***	0.0010	1.1801***
Shared car service	1.0072***	0.7143***	1.3093***	1.1368***	0.8463***	1.3907***
Shared bike parking (indoor)	1.3952***	1.0072***	1.7640***	1.0867***	0.7549***	1.3478***
Garden with terrace	1.0906***	0.9564***	1.2878***	1.1772***	1.0160***	1.3477***
Vegetable garden w/ greenhouse	0.9076***	0.8996***	1.0002***	1.4889***	1.4414***	1.5388***
Hobby room / atelier	0.9557***	0.9435***	1.0954***	0.9099***	0.8684***	0.9946***
Jeu de boules court	-0.4917***	-0.9371***	-0.1986	0.3440**	0.0111	0.5488***
Kitchen with dining room	0.0912	0.0147	0.1532	0.0298	-0.0633	0.0873
Guest room w/ private bathroom	0.6050***	0.3461*	0.8097***	0.7836***	0.6227***	0.8766***
Exercise room w/ sport equipment	1.0229***	0.2915	1.5742***	0.7279***	-0.0743	1.2134***
Laundry room	0.7135***	0.4317**	0.9254***	1.1188***	0.9050***	1.2766***
Wellness area	0.2578*	-0.7162***	0.8430***	0.0311	-0.8222***	0.5234**
Living room	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Coefficients per common facility, for total sample and sub-groups

Sub-groups based on disposal of common facilities.

	Coefficients without costs			Coefficients with costs		
Common facility	Total sample	Sub-group 1	Sub-group 2	Total sample	Sub-group 1	Sub-group 2
Library room with workplaces	0.8043***	1.0576***	-0.4450	0.7775***	1.0013***	-0.2874
Outdoor kitchen with canopy	0.2885**	0.5605***	-1.1602***	0.6587***	0.9016***	-0.5576*
Outdoor swimming pool	0.4200***	0.6717***	-0.8267**	0.6938***	0.9323***	-0.4421
Shared car service	1.0072***	1.2082***	0.1145	1.1368***	1.3284***	0.2910
Shared bike parking (indoor)	1.3952***	1.5998***	0.4919*	1.0867***	1.2614***	0.3542
Garden with terrace	1.0906***	1.1796***	0.8701***	1.1772***	1.2674***	0.9507***
Vegetable garden w/ greenhouse	0.9076***	1.1555***	-0.3001	1.4889***	1.6903***	0.5865**
Hobby room / atelier	0.9557***	1.1510***	0.1121	0.9099***	1.1028***	0.0671
Jeu de boules court	-0.4917***	-0.3666**	-0.9998***	0.3440**	0.5226***	-0.4167
Kitchen with dining room	0.0912	0.2072	-0.3437	0.0298	0.1198	-0.2991
Guest room w/ private bathroom	0.6050***	0.7823***	-0.1482	0.7836***	0.9226***	0.2298
Exercise room w/ sport equipment	1.0229***	1.3045***	-0.4429	0.7279***	1.0276***	-1.0850***
Laundry room	0.7135***	0.9651***	-0.5288*	1.1188***	1.3684***	-0.1159
Wellness area	0.2578*	0.5477***	-1.3878***	0.0311	0.3365**	-2.0551***
Living room	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Coefficients per common facility, for total sample and sub-groups

Sub-groups based on household composition.

	Coefficients without costs			Coefficients with costs		
Common facility	Total sample	Sub-group 1	Sub-group 2	Total sample	Sub-group 1	Sub-group 2
Library room with workplaces	0.8043***	0.7160***	0.9936***	0.7775***	0.5977***	1.1822***
Outdoor kitchen with canopy	0.2885**	0.0947	0.6646***	0.6587***	0.4007**	1.2008***
Outdoor swimming pool	0.4200***	0.0346	1.0715***	0.6938***	0.2866*	1.4624***
Shared car service	1.0072***	0.9763***	1.0832***	1.1368***	1.0624***	1.3336***
Shared bike parking (indoor)	1.3952***	1.3487***	1.4999***	1.0867***	1.0165***	1.2828***
Garden with terrace	1.0906***	1.1430***	1.0006***	1.1772***	1.1308***	1.3188***
Vegetable garden w/ greenhouse	0.9076***	0.8640***	1.0107***	1.4889***	1.3814***	1.7571***
Hobby room / atelier	0.9557***	0.9170***	1.0474***	0.9099***	0.7618***	1.2556***
Jeu de boules court	-0.4917***	-0.6003***	-0.2633	0.3440**	0.2752*	0.5232*
Kitchen with dining room	0.0912	0.0923	0.0863	0.0298	-0.0270	0.1808
Guest room w/ private bathroom	0.6050***	0.5833***	0.6626***	0.7836***	0.7645***	0.8486***
Exercise room w/ sport equipment	1.0229***	0.7161***	1.5978***	0.7279***	0.3996**	1.3682***
Laundry room	0.7135***	0.7047***	0.7376***	1.1188***	1.0104***	1.3836***
Wellness area	0.2578*	0.0031	0.7255***	0.0311	-0.3422*	0.7172***
Living room	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Coefficients per common facility, for total sample and sub-groups

Sub-groups based on urbanization degree living area.

	Coefficients without costs			Coefficients with costs		
Common facility	Total sample	Sub-group 1	Sub-group 2	Total sample	Sub-group 1	Sub-group 2
Library room with workplaces	0.8043***	1.0104***	0.6407***	0.7775***	0.9392***	0.6490***
Outdoor kitchen with canopy	0.2885**	0.2145	0.3415**	0.6587***	0.6935***	0.6368***
Outdoor swimming pool	0.4200***	0.5883***	0.2911*	0.6938***	0.7923***	0.6191***
Shared car service	1.0072***	1.2053***	0.8531***	1.1368***	1.2703***	1.0338***
Shared bike parking (indoor)	1.3952***	1.5355***	1.2891***	1.0867***	1.2570***	0.9528***
Garden with terrace	1.0906***	1.2998***	0.9269***	1.1772***	1.3272***	1.0611***
Vegetable garden w/ greenhouse	0.9076***	1.1106***	0.7488***	1.4889***	1.6637***	1.3514***
Hobby room / atelier	0.9557***	1.1260***	0.8244***	0.9099***	1.0013***	0.8413***
Jeu de boules court	-0.4917***	-0.6994***	-0.3764*	0.3440**	0.3726*	0.3248*
Kitchen with dining room	0.0912	0.2006	0.0100	0.0298	0.1117	-0.0310
Guest room w/ private bathroom	0.6050***	0.8944***	0.3607**	0.7836***	1.0419***	0.5667***
Exercise room w/ sport equipment	1.0229***	1.0134***	1.0375***	0.7279***	0.6981***	0.7513***
Laundry room	0.7135***	0.8097***	0.6425***	1.1188***	1.2405***	1.0251***
Wellness area	0.2578*	0.4016*	0.1489	0.0311	-0.0166	0.0606
Living room	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000