

MASTER

The impact of meeting places on the social interactions and feelings of loneliness of older adults living independently in social apartment complexes

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The impact of meeting places on the social interactions and feelings of loneliness of older adults living independently in social apartment complexes

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Summary

The feelings of loneliness among older adults are of great concern to the government of the Netherlands (Rijksoverheid, 2020a). The government is especially concerned for older adults that will live longer independently. Older adults tend to live longer independently, since they prefer ageing in place. This is also part of the chosen governmental strategy (Rijksoverheid, 2020b). To enable residents to maintain their social interactions and even create more social connections with the neighbors, the Dutch government subsidizes, among others, the creation of meeting places in social housing complexes.

However, it is currently unknown if there are certain characteristics of the meeting places that could have an influence on the social interactions and feelings of loneliness among the residents. This research aims to get more insights in which characteristics of the meeting place can stimulate the social interactions and potentially decrease the feelings of loneliness among older adults that are living independently in social housing apartments. The main research question is as follows.

Which (physical) characteristics of meeting places stimulate social interaction and reduce the feelings of loneliness among older adults living independently in social apartment complexes?

To find out which characteristics have an influence on the feelings of loneliness and the social interaction a literature study was conducted. The literature study gave insights in personal-, socio-environmental and physical environmental characteristics that influence the feelings of loneliness and social interaction among older adults. The characteristics that were found were included in a conceptual model that forms the foundation of this research.

Since there is little to no knowledge about the (physical) characteristics of the meeting place, new data need to be obtained. The first part of the data collection consists of a survey to gather personal characteristics of the residents, social interaction scores, 11-item loneliness scores and experiences of the meeting place. The second part includes the physical characteristics of the apartment complexes. This information was collected by means of an objective checklist that was conducted in participation with (a) member(s) of the residents committee of the complexes. The final part consists of multiple interviews conducted for every location with a member of the residents' committee or other form of organization behind the meeting place and through informal conversations with other residents. The locations where the data was collected were selected based on multiple requirements. The dwellings were owned by different housing associations that had implemented a physical meeting place. The apartment complexes needed to be designed for older adults and located throughout the city of Amsterdam and Diemen.

The dataset includes six apartment complexes that are spread throughout the city. Different approaches were used to contact the residents' committees. Some housing associations provided contact information and some committees were contacted when visiting the location. In all cases an appointment was made to inform about the goal of the research and schedule an interview and the distribution of the surveys. The surveys were distributed in consultation with the residents' committees and the various options were an enlarged physical copy, an e-mail to the residents or a physical printed QR-code that residents could scan with a mobile device to enter the online survey. After several reminders a total of 76 respondents completed the entire survey. The data was transformed, integrated and prepared where necessary to create a fully analyzable dataset. The descriptive statistics gave insight in the distributions of the dependent variables, which was necessary for further analysis. The statistical analyses that were conducted were the independent samples t-test, ANOVA and the Pearson's product-moment correlation.

From the statistical analysis it was concluded that physical characteristics of the meeting place have no significant influence on the feelings of loneliness and the social interaction between neighbors. However, the size of the meeting place did have an influence on the social interaction with family and friends, indicating that a larger meeting place was positively related to a higher social interaction score with family and friends.

In addition to the physical characteristics of the meeting place, this study also examined the perceived experiences of the meeting place from the respondents. To gain more insights in these characteristics the survey included multiple questions about the atmosphere, satisfaction with the atmosphere and the social accessibility of the meeting place. Noticeable is that the importance of the meeting place, the social accessibility, the atmosphere and the satisfaction with the atmosphere were all significantly related with the social interaction between neighbors. It can be concluded that the perceived experiences of residents in the meeting place can be of influence on the social interactions of the residents with their neighbors.

The results of the interviews gave more insights in the organization behind the meeting places. In most cases a residents' committee is responsible for the organization of frequent activities. Residents could also submit ideas or initiatives for activities or events. The goal has proven to be the same for each location, which is to allow resident to have more social interactions with their fellow residents. This research showed that the goal is achieved, but there were some relevant insights that require attention from the residents' committee or housing association, to ensure optimal implementation of the meeting place within the apartment complex.

Ultimately, implementing a meeting place for a housing association without any form of thought or communication with the residents would be a waste of time and space. A meeting place that stimulates social interactions and potentially decreases the feelings of loneliness is a meeting place that is embraced by the residents. A strong organization that organizes weekly to monthly activities for everyone and stimulates residents to join, participate and contribute to the social interaction with fellow residents is beneficial to the common goal of allowing residents to interact with their fellow residents.

This research shows the importance of perceived characteristics of the meeting place as a positive influence on the social interactions between neighbors. Further research could identify all perceived characteristics of the meeting place that could have an influence on the social interaction and feelings of loneliness. This information could contribute to the optimalization of physical meeting place

For further research it is recommended to take a closer look at how meeting places are perceived by residents, as well as the influence of the residents' experiences with the meeting place on their feelings of loneliness and social interactions. From the interviews in this study, some relevant aspects of the meeting place were deducted. An example is the importance of the residents' committee to introduce residents to activities to tackle the social inaccessibility and to create a pleasant atmosphere not by simply decorating the meeting place but to be welcomed and participate with the resident group.

However, it is still unknown which aspects or characteristics of the meeting place could positively influence the social interactions in the meeting place between residents. It could be beneficial to determine more characteristics of the meeting place that positively impact and encourage residents to interact socially in the meeting place. If necessary, it might be decided to adjust the meeting place and its organization according to the additional aspects and characteristics that could be revealed by further research.

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1. Introduction

1.1. Problem statement

In the Netherlands and many other countries in the world the life expectancy is increasing (The World Bank, 2019). Subsequently, the percentage of the Dutch population of 65 years and older has grown from eleven percent in 1975 to twenty percent in 2021 (Central Bureau of Statistics, 2021a). The predictions are that this percentage will increase to 26% near 2040 (Central Bureau of Statistics, 2021b). This indicates the growing population of older adults in the Netherlands.

As a result of this growth, nursing homes could overflow. Therefore, a policy change was necessary. With the program “Langer Thuis” (Rijksoverheid, 2020b) older adults are stimulated to live longer in their own home. This program allocates millions of euro’s available for better support and care at home, assistance to informal caregivers and volunteers and more suitable housing for older adults. With this program, in combination with the “Wet maatschappelijke ondersteuning 2015” (Rijksoverheid, 2015) older adults are stimulated to live longer in their own home. According to the WoonOnderzoek, the “Langer Thuis” program responds to most of the wishes and needs of the population of older adults (Ministry of Health, Welfare and Sport, 2018). Moreover, these changes will contribute to the reduction of governmental expenses for care (Rossum et al., 2014).

However, there are not only advantages to older adults being able to live longer in their own homes. One large disadvantage that occurs is that older adults can become lonely and will have less social contact than they desire (RIVM, 2020). The consecutive problem is that loneliness can increase the chance of poor health behaviors, physical health problems and psychiatric conditions (Crewdson, 2016). A cooperation between the Municipal Health Services, the Central Bureau for Statistics and the National Institute for Public Health and the Environment (RIVM) has investigated loneliness among older adults in the Netherlands. The study “Gezondheidsmonitor” revealed that more than 56% of older adults aged 75 and over experience loneliness (RIVM, 2020). With the growing population of older adults in the Netherlands, loneliness can be stated as a problem that requires more attention. In 2021 there are more than 1,3 million older adults of 75 and over and this number is predicted to increase to 2,1 million in 2030 (Ministry of Health, Welfare and Sport, 2018). The older adults that live longer in their own homes are susceptible to loneliness and the associated adverse effects.

Based on the aforementioned reasons, it can be concluded that loneliness is a serious problem that requires attention. It has even been referred to as a “silent killer” (Pennycook, 2016). Loneliness is based on feelings and every individual can experience this in different ways, which means that multiple intervention techniques are applicable. A recent development proposed by the Dutch government in order to battle loneliness is the creation of physical meeting places designed for older adults (Netherlands Enterprise Agency, 2022). With more social interactions between the older adults within their neighborhood or complex the feelings of loneliness could be decreased. This strategy seems easy, but it is unclear if there are physical characteristics or experiences that could influence the feelings of loneliness and social interactions. Therefore, this research aims to identify such physical characteristics of the meeting places that might influence the feelings of loneliness and social interaction among older adults. This research will focus on already implemented physical meeting places in social apartment complexes for older adults. Older adults are defined as 65 years and up.

1.2. Research question

According to the government of the Netherlands and other studies (Netherlands Enterprise Agency, 2022; ter Avest, 2016; de Jong et al., 2015), a physical meeting place is an intervention that increases social interactions within the neighborhood and could decrease the feelings of loneliness among older adults. A physical meeting place can have many forms and it is currently unknown what characteristics of the physical meeting place are the most beneficial, in order to increase social interactions and decrease the feelings of loneliness. This research will take a closer look at the different existing meeting places in Amsterdam and the different characteristics that contribute to the reduction of loneliness of the residents. The research question is as follows:

Which (physical) characteristics of meeting places stimulate social interaction and reduce the feelings of loneliness among older adults living independently in social apartment complexes?

The main research question can be divided into multiple sub-questions that will help answering the main question. The following sub-questions have been formulated.

What is loneliness and what are the effects on older adults?

Which personal and socio-environmental characteristics influence feelings of loneliness?

Which personal and socio-environmental characteristics influence social interaction?

Which physical environmental characteristics have an influence on feelings of loneliness and social interaction?

Which meeting place characteristics have an influence on feelings of loneliness and social interaction?

Which social characteristics of the meeting space encourage social interaction and possibly reduce feelings of loneliness?

With the research and sub-questions taken into account, a basic conceptual model can be created. Figure 1 shows the basic conceptual model that will be used for this research.

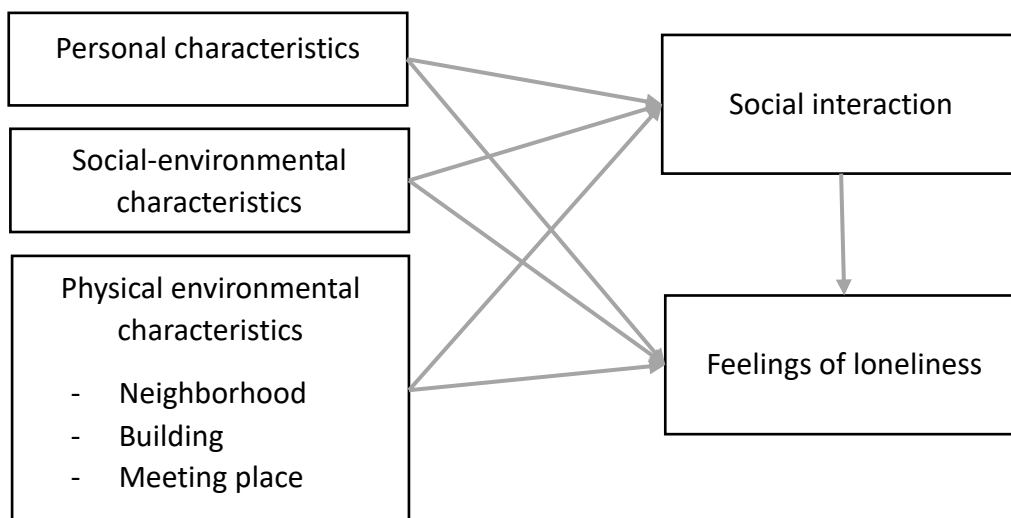


Figure 1: Basic conceptual model of the feelings of loneliness & social interaction

The conceptual model shows that this research includes four groups of independent variables that could potentially have an effect on the feelings of loneliness and social interaction among older adults. To get a better understanding of these independent variables, it is important to gather more information by conducting literature research.

1.3. Structure of the research

The structure of this research will be described in this paragraph. The introduction gave a first glance of this research and stated the current problem and formulated the research questions. Chapter 2 will take a closer look at the existing literature that will transform the basic conceptual model to a definitive conceptual model. The definitive conceptual model will be the foundation for further analysis. The methodology will be described in chapter 3 and will briefly describe how the data will be collected and transformed to make them ready for the analysis. Chapter 4 specifies the descriptive statistics of the collected data, the final transformations or adjustments that might need to take place and the results of the interviews. Chapter 5 present the conducted analysis that will be performed for the independent and dependent variables. Chapter 6 will interpret the results with the literature and other studies taken into account. The research ends with chapter 7 that answers the research question and formulates the conclusion of this research.

2. Literature research

As a result of the increased life expectancy, the population of older adults is growing. The demographic composition of the Netherlands shows that the population of older adults (65 and over) has grown to 3.457.535 (Central Bureau of Statistics, 2020b). This is over nineteen percent of the total population of the Netherlands, and it clearly shows the ageing process that is taking place (Central Bureau of Statistics, 2020b). The expectation is that the number of older adults will continue to grow to 4.2 million (Central Bureau of Statistics, 2018). Most of these older adults live in their own homes. Only a small part (3,3% or 115.000) of the older adults is living in a nursing home (Central Bureau of Statistics, 2019). With only a small amount of nursing beds available, it is important to determine who needs this type of care the most. This is included in the Long-term Care Act (in Dutch “Wet langdurige zorg”). This act provides selection criteria for eligibility for long-term care. The organization that assesses these criteria is CIZ (“Centrum Indicatiestelling Zorg”) (CIZ, 2021). Older adults that live in nursing homes are often 85 years and older and or cannot perform their daily activities due to a chronic illness (dementia and others), incontinence and trouble with hearing and/or seeing (American Geriatrics Society's Health in Aging Foundation, 2020). The reason older adults are living longer independently is that 79% of the older adults that live independently simply do not want to move, even though their need for medical care will increase.

Many older adults prefer to age in their own home. This is also stimulated by the Dutch government. Up until 2021, the government invested 340 million euros with help of the program “Langer Thuis” (Rijksoverheid, 2020b). This capital investment aimed at three different types of actions: better support and care at home, help for informal caregivers and volunteers and more suitable dwellings for older adults. There are several reasons the government stimulates the older adults to age in place. The most important reason is the scarcity of nursing homes. There are not enough nursing homes to take care of every older adult. With this relatively small financial injection from the “Langer Thuis” program, it can be concluded that the government of the Netherlands have chosen the strategy to stimulate the older adults to age in place, while they also reduce financial costs of building and providing many more nursing homes that would potentially costs millions. On the other hand, living longer independently could cause

Unfortunately, the older adults may encounter several problems when living longer independently. The first problem involves the physical state of the older adults. They can experience a decrease in capability (vision, thinking, locomotion, reaching, hearing and dexterity) and daily activities (cooking, housework, shopping and transportation) over time (Seidel et al., 2009). The physical decline is part of the ageing process (Amarya et al., 2018) and can only be slowed down by maintaining the physical activities when ageing (Wagner et al., 1992). The decrease in physical state of the older adults can result in moving to a nursing home or forms of home care. Furthermore, older adults may experience mental problems ageing in place. For example, the isolation of older adults increases the risk of depression and Alzheimer’s disease (Cornwell & Waite, 2009).

2.1. Loneliness

A commonly used definition of loneliness in the Netherlands is the following: “Loneliness is a situation experienced by the individual as one where there is an unpleasant or inadmissible lack of (quality of) certain relationships” (de Jong-Gierveld, 1998). The feelings of loneliness is the perception of individuals that the social relationships are not living up to the certain expectation (Heinrich & Gullone, 2006). Loneliness is a feeling that can be different for every individual, but there are roughly two types of loneliness: emotional and social loneliness (van Tilburg & de Jong-Gierveld, 2007). Emotional loneliness is the lack of a partner or family relations and can evolve from the loss of a partner, the loss of contacts with family members or being childless. Social loneliness can occur when people have a small social network with little to no variation (van Tilburg & de Jong-Gierveld, 2007). Furthermore, there is an increased possibility for older adults to become lonely when an important social relationship disappears (Luanaigh & Lawlor, 2008). This can be caused by widowhood, retirement, children leaving home or age-related health problems (Holt-Lunstad, 2017).

To get more insights in the level of loneliness and certain trends, three organizations in the Netherlands cooperated in national research. The organizations involved are the Municipal Health Services, Central Bureau of Statistics and the National Institute of Public Health and the Environment (RIVM). From their study it can be concluded that the percentage of older adults that experience a form of loneliness is increasing with age, as can be seen in Table 1. It is clear that a large part of the older adults will experience some form of loneliness, but the exact consequences are yet unclear.

Table 1: Loneliness displayed in age. Source: RIVM (2020)

Age	Total loneliness	Moderately lonely	Severe lonely
65 – 74	44.6%	35.4%	9.2%
75 – 84	53.6%	42.4%	11.2%
85 +	65.9%	51.6%	14.3%

Loneliness can have major consequences for every individual experiencing this feeling. According to Holt-Lunstad (2017), lacking social connection significantly increases the risk of premature mortality. Loneliness can result in a decrease in well-being that could have the form of sleeping problems, depression and disturbed appetite (de Jong-Gierveld, 1998). Furthermore, loneliness can develop personality and adaptation disorders such as loss of self-esteem, forms of anxiety, stress, powerlessness and alcohol overconsumption (Nerviano & Gross, 1976). This makes loneliness the latent cause of placement in nursing homes and/or hospitalization (Mor-Barak & Miller, 1991).

Although the government of the Netherlands stimulates living independently, it also recognizes the consequences it may have for older adults. This was one of the reasons to initiate the program “Eén tegen eenzaamheid” where the Ministry of Health, Welfare and Sport supports all the municipalities in the fight against loneliness (Rijksoverheid, 2020b). The goal of the program is to identify, inform and tackle the loneliness that older adults are experiencing. One of the spearheads is to set up the physical infrastructure to combat loneliness. With this program, the Dutch government acknowledges that loneliness is a serious problem that needs greater attention.

2.2. Social interaction

According to 'Introduction to sociology', a social interaction is *"the process of reciprocal influence exercised by individuals over one another during social encounters"* (Little, 2016). Social interactions could consist of face-to-face encounters where the people are physically present or digital interactions via (text)messages and other digital forms of communication. Older adults prefer face-to-face physical interactions (Yuan et al., 2016), but have adopted the telephone communication and other digital communication methods (Central Bureau of Statistics, 2020a). It was found that older adults that are socially involved, participate in the community or social activities, are more likely to report a good or very good health (Sirven & Debrand, 2008). Social interactions are also needed to maintain the social network and to keep the connection with your relatives and friends. It is a long time known that the feelings of loneliness can be reduced by social interaction (Lee & Ishii-Kuntz, 1987).

As mentioned earlier, a social network is crucial in the fight against loneliness, to maintain contacts as well as establishing new ones. The physical infrastructures that can stimulate social interactions are parks, public gardens, libraries, churches, swimming pool, community center, restaurants and covered shopping centers (Thissen & Vanderstraeten, 2015). Furthermore, social interactions also take place within complexes, where residents share common spaces and/or rooms where spontaneous or planned social interactions could take place.

The most recent development is the stimulus package for the development of meeting places by housing associations, citizen initiatives and other market participants (Netherlands Enterprise Agency, 2022). This package creates the opportunity to accommodate the need for meeting places and social interactions for older adults, in order to maintain their social network and create new relationships. The decrease in feelings of loneliness is not the only goal that the government of the Netherlands wants to achieve by stimulating the implementation of physical meeting places. The second goal is to increase social interactions within the neighborhood and especially the direct neighbors.

In this research the characteristics of meeting places on older adults that are living independently in social houses will be investigated. To measure the effect of the characteristics on the social interactions and feelings of loneliness it is necessary to dive deeper into the factors that could have an influence on the feelings of loneliness and the number of social interactions. This will be done by looking at personal, social-environment and built environmental characteristics that could have an influence on the feelings of loneliness and social interactions of older adults that live independently in social apartments.

2.3. Influences on loneliness and social interactions

In this paragraph the influences on the feelings of loneliness and the social interactions will be described. The personal characteristics will be described in subparagraph 2.3.1., the social-environmental in 2.3.2. and the physical environmental characteristics in 2.3.3.

2.3.1. Personal characteristics

There are multiple personal characteristics that have an influence on the feelings of loneliness and/ or on the social interactions that should be taken into account. The first demographic variable that will be taken into account is the **age** of older adults. Age plays a role in social interactions of older people, as social interaction with friends decreases the older a person gets (Coumans, 2010). According to research (de Jong-Gierveld et al., 2006; Hawkey, et al., 2008) the feelings of loneliness increases when adults become older. This is also visible and in line with the loneliness score of the Netherlands in Table 1.

The feelings of loneliness is different for every individual, but can also be experienced differently when it comes to **gender**, male or female (Chodorow, 1978; Pinguart & Sörensen, 2001a). According to other studies (Pinguart & Sörensen, 2001a; Domènech-Abella et al., 2017) older females reported more loneliness compared to men of the same age. It is known that women have more social interactions compared to men (Coumans, 2010; Scheepers & Janssen, 2001).

Moreover, people's backgrounds may differ and according to research, migration status also has an influence on the feelings of loneliness among older adults. It is striking to see that in the older group of elderly (80+) **migration background** has virtually no impact, while it does have a significant impact in the young- and the middle-old groups (Wu & Penning, 2015).

Another demographic factor that influences the feelings of loneliness among older adults is the **level of education**. Older adults with a higher educational degree were less likely to become lonely (Pinguart & Sörensen, 2001b; Savikko et al., 2005; Domènech-Abella et al., 2017). This is also visible in the social interaction, where the lowest education levels have the least amount of social contact with family and friends (Coumans, 2010). **Income** is in line with the educational level, where adults with a higher income are less likely to feel lonely compared to lower income classes (Savikko et al., 2005). A possible explanation is that older people with higher incomes have more opportunities to undertake activities where they meet new people, while people with lower incomes have more difficulty doing so due to the costs involved.

So, there are multiple factors that have an influence on the health of older adults. These factors can be categorized in physical and psychological categories. The **physical health** problems that elderly may encounter which can have an influence on the feelings of loneliness are a decrease in vision and hearing (Savikko et al., 2005; Victor et al., 2015; Fokkema et al., 2012) and limitations on mobility (Pinguart & Sorensen, 2001; Theeke, 2009; Schnittger et al., 2011). **Mental health** problems among older adults are strongly associated with emotional loneliness, mainly depression (Peerenboom et al., 2015).

However, research has shown that **volunteer work** could alleviate loneliness among older adults that have recently become widowed (Carr et al., 2018). A possible explanation is that volunteer work will increase the social interaction and contacts with other volunteers. It also stimulates older adults to participate in the neighborhood or community.

2.3.2. Social environment

Similarly, the social network of older adults also plays an important role when it comes to loneliness (Domènech-Abella, et al., 2017). The **size of the social network** can have an influence on the feelings of loneliness (de Jong-Gierveld & van Tilburg, 2010), but this is not the case with the **number of social interactions**. According to research, a lower number of social interactions does not necessary lead to an increased feelings of loneliness or a decrease in satisfaction with the social network (Delmell et al., 2013).

Partner status is a factor found in multiple studies to have an influence on loneliness. People with a partner tend to be more and better protected from loneliness than people without a partner (Wenger et al., 1996; de Jong-Gierveld & van Tilburg, 2010). This can be explained by the simple fact that living with a partner will always guarantee at least one social connection. In addition to living with a partner, older adults tend to feel less lonely if they are living with a partner and have one or more **children** (Demakakos et al., 2006). Children contribute to the social network with their visit to the parents and tend to decrease depressive symptoms (Buber & Engelhardt, 2008).

Moreover, **friends** play an important role in the social network of individuals. Individuals with no friends feel lonelier compared to individuals with friends (Demakakos et al., 2006). Local neighbors are also social contacts that can improve the social network of an individual. Momentarily it is unclear what the effect of close contacts with neighbors are, but it is known that this does improve the place attachment and stimulates social inclusion and satisfaction (Dallago et al., 2009; Livingston et al., 2008). Yu et al. (2021) found that **neighborhood social cohesion** is associated with loneliness, where higher levels of neighborhood social cohesion was associated with lower social and overall loneliness feelings.

2.3.3. Physical environment

The final subcategory is the physical environmental characteristics, and this can be divided into the neighborhood, the building and the meeting place.

Neighborhood

The **presence of green space** has an important influence on the feelings of loneliness. Researchers discovered that when people have less green space in their living environment this coincided with feelings of loneliness and a shortage of perceived social support (Maas et al., 2009). Reduced feelings of loneliness can also be related to the **presence of facilities** in the neighborhood including markets, post offices, libraries, leisure facilities, transit stops, seating areas and food stores (Domènech-Abella et al., 2020). What is striking is that the distance to parks and green do not have an effect on loneliness (van den Berg et al., 2016a). Van den Berg et al. (2016a) found that the distance to daily shopping facilities also does not affect the feelings of loneliness, but the distance to the highway access was discovered to have an effect on the feelings of loneliness. This can be caused by the increased mobility and possible transportation to increase social interactions. The presence and distance of the facilities can also play a role in the satisfaction with the neighborhood. It is found that people who are satisfied with their facilities and their neighborhood tend to feel less lonely (van den Berg et al., 2016b).

Research has found that living in a rural area was associated with a higher chance of loneliness (Domènech-Abella et al., 2017). On the other hand, there are studies that have shown that urban density of the residential area is not affecting the feelings of loneliness or social isolation (van den Berg et al., 2016b).

The mobility of older adults can play an important role in the social interactions and the emotional- and social well-being of people (Spinney et al., 2009; Metz, 2000). According to recent publications, the **use of different transportation methods** (public transport, car, bicycle and other forms) is significantly related to lower levels of loneliness (van den Berg et al., 2016a; Weijs-Perrée et al., 2015). This can possibly be explained by the fact that access to transportation methods may increase the number of social interactions and the possibility to maintain the social network contacts.

Child et al. (2016) found that walkable destinations, accessible transit stops and amenities and attributes for structural support for physically moving around the neighborhood (sidewalks, recreation facilities and connectivity) were associated with increased interactions with neighbors. The importance of walkability was also found in the study of van den Berg et al. (2017), where the frequency of important social interactions was positively associated with the frequency of walking or cycling.

Building

The next step is to take a closer look at the actual building that the target group lives in. It was found that the younger generation living in single family dwellings are less likely to feel lonely compared to people living in apartments (Delmelle et al., 2013), but it has been found that this is not the case for older adults (van den Berg et al., 2016b). This research will look further into apartment complexes. Therefore the literature will focus on this dwelling type.

Research has shown that the **size of a community** has an influence on the social interactions (Smith, 1986; Fromm, 1991). Overall was noticeable that large size communities have fewer social interactions. This can be caused by the fact that living with many other residents gives a certain anonymity where they are less inclined to socially interact with their home environment. On the other hand, very small communities have the opposite problem, where residents feel like they have a lack of privacy that could result in withdrawal from social interaction with the community (Williams, 2006).

In line with the size of the community is the multi-story building. This type of building can reduce the short-term and spontaneous social interactions. This can be caused by the fact that the residents of the upper floors find it too much effort or cannot be bothered to join the public areas (Abu-Ghazze, 1999). **Low-/medium-rise** is important to optimize the social interactions of the residents in the building complex (Williams, 2006).

As mentioned earlier, the physical meeting places where older adults meet each other include parks, public gardens, libraries, churches, swimming pool, community center, restaurants and covered shopping centers (Thissen & Vanderstraeten, 2015). Another possible meeting place is the **common spaces** inside a building complex. Without common spaces, residents have little to no room to meet their neighbors. The common spaces where social interactions could take place are the entrance/ exit of the building, hallway, stairs, elevator, storage room and other shared facility rooms, mailboxes, bicycle parking and the garage. This could result in an increased chance that these residents feel socially alienated (Evans, 1979). These social spaces are the most effective when they are shared and accessible by familiar neighbors, where there is room for interactions, expansion of their social network and a shared responsibility of the space (Ferguson & Ferguson, 2016).

2.3.4. Meeting place

The most important part of the meeting place is the visibility and accessibility (Center for community Health and Development, 2020). Which is understandable, because without visibility and accessibility the meeting place would just be an unusable space. The **visibility** starts from outside where sign, plaques and other forms of visibility could indicate that the meeting place is accessible for the residents and possibly other neighbors. The meeting place should be inviting and therefore be visible from outside or within the complex. Another important factor is the **accessibility** of the meeting place. This starts with reaching the entrance as resident. Older adults can become less mobile and therefore the meeting place should be optimally accessible with an elevator and without thresholds. This also applies to inside the meeting place. In addition, it is important that the space is also accessible to disabled people and that there is sufficient room for movement for people in wheelchairs.

There could be certain **facilities** within the meeting place that could stimulate the social interaction among the residents. Recreation and sport facilities (Yoo & Lee, 2016) stimulate the social interaction between neighbors and could be implemented within the meeting place. There is still very little information about different facilities that could stimulate the social interaction and reduce the feelings of loneliness among the neighbors.

2.4. Conceptual model

It can be concluded that the older adult population is growing, and people tend to live longer independently. The largest concern is the feelings of loneliness among these older adults and the lack of social interactions that could have negative consequences for the well-being of the older adults. To assess the influences on social interaction and loneliness, a distinction was made between personal, socio-environment and physical environmental characteristics. These influences are incorporated in the conceptual model, which will be the guideline for this research. It is currently unknown which characteristics of the meeting place stimulate the social interaction with older adults that live independently in social apartment buildings. This research will look further into the different characteristics of the meeting place that could have an influence on the feelings of loneliness and social interactions of the older adults that are living independently in social complexes. The conceptual model is visualized in Figure 2.

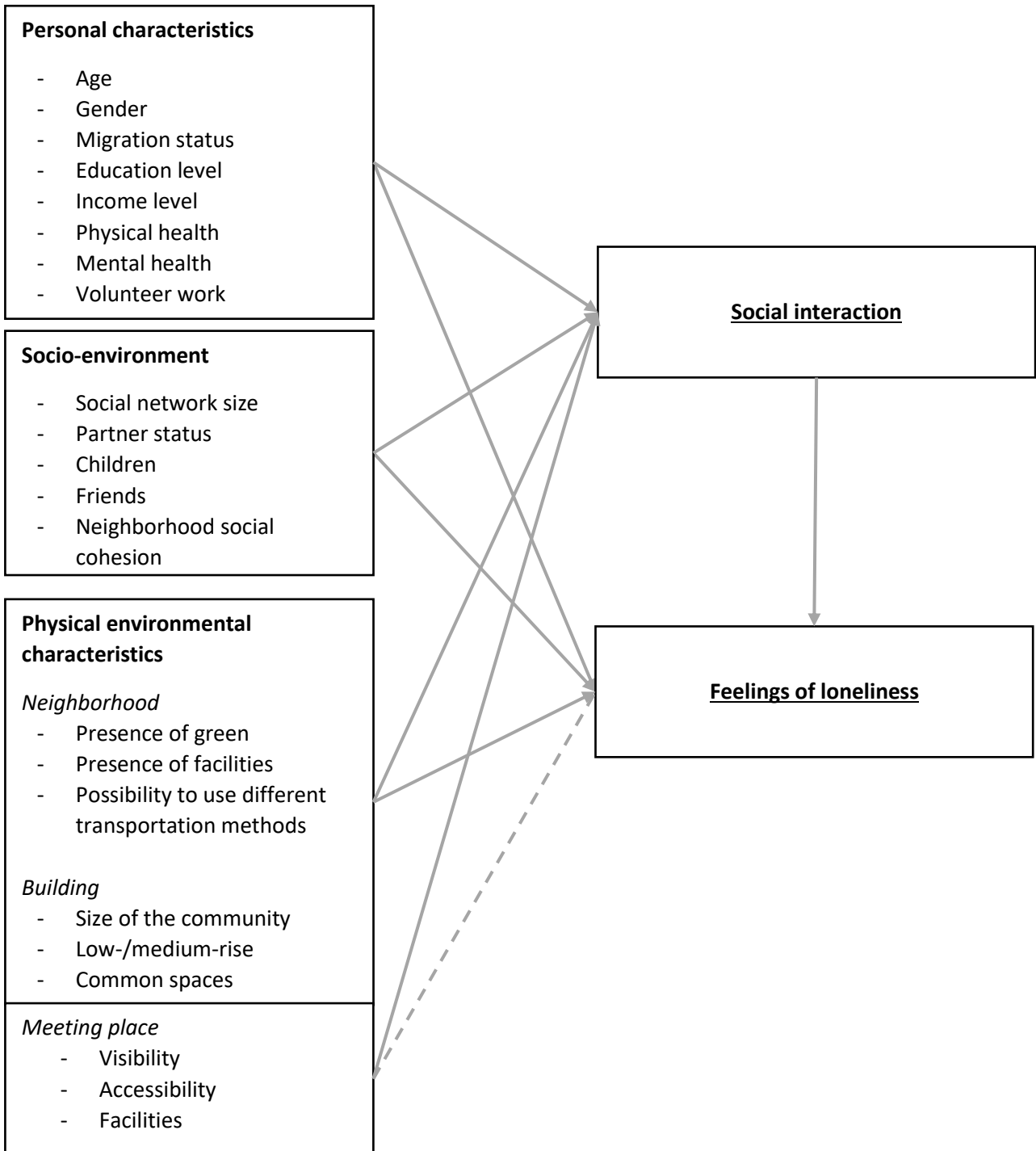


Figure 2: Conceptual model

3. Methodology

New data was needed to test the relationships as indicated in the conceptual model data was needed. Three different approaches to gather the data were applied. The first method is by means of a survey. The survey measured the personal and socio-environmental characteristics that influence the social interaction and feelings of loneliness. The survey also included the social experiences from the respondents of the physical meeting place within their building. The characteristics of the built environment that might have an influence on the social interaction and feelings of loneliness were objectively gathered through a checklist with assistance from the responsible residents' committee or spokesperson. The final approach was through semi structured interviews with the responsible member(s) of the residents' committee and informal conversations with residents. With these results the effects of a physical meeting place in social housing on the feelings of loneliness among older adults that are living independently will be analyzed. This chapter will briefly describe the different methods of the data collection.

3.1. Operationalization

The literature research described personal and environmental characteristics that could have an influence on the social interaction and feelings of loneliness of older adults. An overview of the independent variables is visible in Table 2.

Table 2: Overview of the independent variables

Personal characteristics	Socio-environmental characteristics	Physical environmental characteristics
<ul style="list-style-type: none"> - Age - Gender - Migration status - Education level - Household income - Physical health - Mental health - Volunteer work 	<ul style="list-style-type: none"> - Partner status - (grand)Children - Friends - Neighborhood social cohesion 	<p><i>Neighborhood</i></p> <ul style="list-style-type: none"> - Presence of green - Presence of facilities - Presence of transportation methods <p><i>Building</i></p> <ul style="list-style-type: none"> - Size of the community - Low-/medium-rise - Common spaces <p><i>Meeting place</i></p> <ul style="list-style-type: none"> - Visibility - Accessibility - Facilities

3.1.1. Personal characteristics

According to the literature research there are multiple personal characteristics that could have an influence on the feeling on loneliness and the social interaction. The survey covers these characteristics with multiple questions. The different questions are illustrated in Table 3 and 4.

Age is an important factor since the research is about older adults and the feelings of loneliness. According to the literature research age can be an influence on the feelings of loneliness, were people of increased age experience more feelings of loneliness. A question about age in the questionnaire gives the opportunity to make sure only the target group (older adults 65+) is included in the research. The question "What is your year of birth?" will cover the age characteristic and makes sure the participants do not need to calculate their birthday if they have forgotten how old they are exactly.

The second personal question is about the **gender** of the participant. With the following question "To which gender identity do you most identify?", the respondents will be given the opportunity to specify

their gender in the way they identify themselves. The traditional female and male options can be chosen or the option to identify as they prefer by choosing “Other”.

The third personal question is to inform if the respondent has a **migration background**. The question “Do you or your family have a migration background?” provides the information if the respondent has a migration background. In this case it is not necessary to determine what migration background the respondent has. Therefore, this will not be included in the survey.

The next question is to get more insights into the **education level** of the respondent. With the question “What is your highest completed level of education?” the respondent will give more information on their educational background. By giving the choice of lower, medium, higher, none and other a distinction is made between the various levels of education. Examples are also provided, in order to make it easier for the respondent to assign themselves in a certain category.

The **income levels** for social housing are regulated. According to the Woonbond (2021) the single household income with AOW is set at €23.975 and the multiple household income is set at €32.550. Therefore, it was decided that the highest option would be a monthly income of €4.001 and above. The other categories were set at 3.001-4.000, 2.001-3.000, 1.001-2.000, lower than 1.000 and do not know/prefer not to share.

Table 3: Personal characteristics; age, gender, migration background, education level and household income

Personal characteristics	
What is your year of birth?
To which gender identity do you most identify?	<input type="checkbox"/> Female <input type="checkbox"/> Male <input type="checkbox"/> Other
Do you or your family have a migration background?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Do not wish to answer
What is your highest completed level of education?	<input type="checkbox"/> Primary school or less <input type="checkbox"/> MAVO, VMBO or Lower vocational education <input type="checkbox"/> Secondary vocational education (MBO) <input type="checkbox"/> HAVO/VWO <input type="checkbox"/> Higher professional education (HBO) <input type="checkbox"/> University bachelor/ master <input type="checkbox"/> Other
What is your net household income? (including salary, pension and other incomes)	<input type="checkbox"/> Lower than 1.000 <input type="checkbox"/> 1.001 – 2.000 <input type="checkbox"/> 2.001 – 3.000 <input type="checkbox"/> 3.001 – 4.000 <input type="checkbox"/> Higher than 4.000

The Self-Rated Health Scale (Ware & Sherbourne, 1992) is used to measure the health of the participant with only two questions. Since we want to see the differences between **physical and mental health** both were revised to the following questions: “In general, would you say your physical health is poor, fair, good, very good or excellent?” and “In general, would you say your mental health is poor, fair, very good or excellent?”. The questionnaire was limited to these two questions, since asking more health-related questions could make it complicated for the participants. Moreover, determining the health of the respondents is not the main goal of this research.

The last personal question will gather information about the **volunteer and community work** of the respondent. The question is “Do you partake in volunteer work, or other community services?”.

Table 4: Personal characteristics; mental health, physical health, volunteer work and household composition

Personal characteristics	
In general, would you say your mental health is:	<input type="checkbox"/> Excellent <input type="checkbox"/> Very good <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor
In general, would you say your physical health is:	<input type="checkbox"/> Excellent <input type="checkbox"/> Very good <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor
Do you partake in volunteer work, or other community services?	<input type="checkbox"/> Yes <input type="checkbox"/> No
What is your household composition	<input type="checkbox"/> Living alone <input type="checkbox"/> Living with partner <input type="checkbox"/> Living with partner and children <input type="checkbox"/> Living with other family members <input type="checkbox"/> Living with friend(s)/ others

3.1.2. Socio-environmental characteristics

The literature study has determined the socio-environmental characteristics that could have an influence on the feelings of loneliness and social interactions of older adults. These characteristics are included within the survey and will be described within this paragraph.

Partner status can have an influence on the feelings of loneliness and the social interaction since a partner can be a daily contact or a very close friend that people see very often. The partner status was determined by using two questions. The first question was about the household composition, to make sure if the respondent is currently living independently or with a partner. The second question was how often they have face-to-face contact with their partner. This gives insight whether the respondent has a partner and if they are living together. This was also applied to the variable **(grand)children**. The respondents were most likely not living with their children since the target group is older adults, but with the question about how often they have face-to-face contact it is indicated how often they see their children and if they have any children. As mentioned in the literature study, individuals with no **friends** feel lonelier compared to individuals with friends (Demakakos et al., 2006). This makes friends an important variable to include in the questionnaire. The frequency of social contacts with friends and relatives was found to have an influence on the quality of life of older adults (Luna et al., 2020).

With the question “How often do you have face-to-face contact with the following people?” the respondent indicated the frequency of contacts with their partner, children, other family members, friends, other **residents of the building** and **other neighbors** or indicate if not applicable. The frequency of these contacts is as depicted in Table 5.

Table 5: Socio-environmental characteristics; partner, (grand)children, other family, friends, residents and other neighbors

This section will provide information on the social interactions of the respondent									
	Daily	2 – 3 times a week	Once a week	2 – 3 times a month	Once a month	Several times half a year	Several times a year	Rarely to never	Not applicable
How often do you have face-to-face contact with the following people:									
Partner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(Grand)children	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other family	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Friends	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Residents of the building	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other neighbors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The last variable that could have an influence on the social interaction and the feelings of loneliness is the neighborhood social cohesion. Unfortunately, only respondents of the chosen locations will be participating in this survey and therefore **building social cohesion** is further used within this research, instead of social cohesion in the neighborhood. With four questions the building social cohesion was measured. The first part consists of two questions that answer how often the respondents have their neighbors over and how often they visit their neighbors. The second part is the satisfaction of the social contacts with their neighbors based on a five-point Likert-scale. Both parts are visible in Table 6 and are included in the survey.

Table 6: Socio-environmental characteristics; Building social cohesion

	Daily	2 – 3 times a week	Once a week	2 – 3 times a month	Once a month	Several times half a year	Several times a year	Rarely to never	Not applicable
How often do you have people from your building come over to your home?									
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often do you visit people in your building in their homes?									
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

This section will provide information about the social contacts of the respondent	
How satisfied are you with your social contact with the people in your building?	<input type="checkbox"/> Very satisfied <input type="checkbox"/> Satisfied <input type="checkbox"/> Neutral <input type="checkbox"/> Dissatisfied <input type="checkbox"/> Very Dissatisfied

3.1.3. Physical environmental characteristics

The physical environmental characteristics has been divided into three categories: the neighborhood, building and meeting place characteristics. The categories were integrated within the checklist that will be filled in when visiting the locations. Table 7, 8 and 9 cover the physical characteristics that are included within the checklist and Table 10 includes the perceived characteristics of the meeting place in the survey.

Neighborhood

The **presence of green** and **facilities** are determined to be variables that could have an influence on the feelings of loneliness and social interactions of older adults. To determine if these facilities are present in or around the neighborhood within a walkable distance that older adults can cover, should be determined. The six-minute walking distance (6MWD) is a commonly used test for functional exercise capacity of older adults with heart problems (Guyatt et al., 1985). The tool is also applied on healthy older adults and the results show an average distance of 631 meters that can be covered by older adults within the walkable six-minutes (Troosters et al.,1999).

The presence of green can have different forms. A distinction was made between different forms of green and the following types are included in this research: park, courtyard, lawn, playing field or the option not present. The presence of facilities was determined for the following facilities: grocery store, convenience store, drugstore. If none of these facilities were present, the option 'not present' could be chosen.

The possibility to use different **transportation methods** was also included in the checklist. The possible transportations methods were bicycle, car, bus, tram, train and metro. Some of the transportation methods (bicycle and car) are always within walking distance, but especially the public transportation methods (bus, trams and train) can be important for the target group.

Table 7: Physical environmental characteristics; neighborhood variables

Neighborhood checklist	
Presence of green within walking distance	<input type="checkbox"/> Park <input type="checkbox"/> Courtyard <input type="checkbox"/> Lawn <input type="checkbox"/> Playing field <input type="checkbox"/> Not present
Presence of daily shopping facilities within walking distance	<input type="checkbox"/> Grocery store <input type="checkbox"/> Convenience store <input type="checkbox"/> Drugstore <input type="checkbox"/> Not present
Transportation possibilities within walking distance	<input type="checkbox"/> Bicycle <input type="checkbox"/> Car <input type="checkbox"/> Bus <input type="checkbox"/> Tram <input type="checkbox"/> Train <input type="checkbox"/> Metro

Building

According to the literature research the **size of the community** in the building can have an influence on the social interactions of the residents within a complex. Therefore, the size of the apartment complex should be determined before identifying the locations. The minimum requirement was set at 30 apartments and the maximum at 125 apartments, with the knowledge that very small communities might feel a lack of privacy and very large communities could lead to anonymity and withdrawal from social activities. Another reason why the minimum is set to 30 apartments within the complex is caused by the fact that smaller complexes may lead to too few potential respondents.

The next variable that might influence the social interaction and loneliness is the **low-/medium-rise** complex. Medium-rise buildings in Amsterdam have a maximum height of 30 meters (Dienst Ruimtelijke Ordening, 2011), that can be translated to a maximum of 10 floors. This was taken into account when determining the locations for this research and will be included in the checklist.

Within the building are different types of **common spaces** where the social interactions between residents could take place. The common spaces that were included within the checklist are: entrance hall, corridor, balcony, dedicated meeting place, laundry room, (parking) garage, storage room and garden. These spaces were included in the checklist and questionnaire to determine where the residents greet and/or talk to fellow residents.

Table 8: Physical environmental characteristics; building variables

How many floors does the building have?	<input type="checkbox"/> Two or less <input type="checkbox"/> Three to four <input type="checkbox"/> Five to six <input type="checkbox"/> Six to seven <input type="checkbox"/> Eight or more
How many apartments does the building have? Apartments
What type of corridors does the complex have?	<input type="checkbox"/> Individual <input type="checkbox"/> Vertical <input type="checkbox"/> Horizontal
Which common spaces are located in the complex?	<input type="checkbox"/> Entrance hall <input type="checkbox"/> Corridor <input type="checkbox"/> Garden <input type="checkbox"/> Balcony <input type="checkbox"/> Laundry room <input type="checkbox"/> Bicycle parking <input type="checkbox"/> Garage <input type="checkbox"/> Dedicated meeting place

Meeting place

The most important building characteristic that was included in this research is the meeting place within the apartment complex. The meeting place is an important aspect in the questionnaire as well as the checklist. The checklist covered the visibility, accessibility, facilities, size, form, natural daylight, type of activity, decoration and reconfigurable. The physical meeting place characteristics can be found in Table 9 and the experiences of the meeting place in Table 10.

The **visibility** of the meeting place is measured from the outside as well as the inside of the apartment complex. The inside can be indicated with direction and entrance sign(s). The visibility can be important for new residents or people that have not used the meeting place and are unaware of the location within the complex. The accessibility of the meeting place located within the apartment complex is linked to the visibility. The **accessibility** was checked with regard to the accessibility for less mobile and disabled people. Thresholds, stairs and steps are most commonly factors that could negatively influence the accessibility for older adults (KBO-PCOB, 2020) The checklist also took into account on which floor the meeting place is located.

The meeting place can have different functions and also a variety in **facilities** present. Facilities that were taken into account are toilet, kitchen and/or pantry, sink, bar, tables, desks, seating places, entertainment system, coffee/tea equipment, air conditioning and WIFI. With the facilities taken into account it may be important to identify what activities the meeting place facilitates. This could be relaxing, study/focus, dining, meetings, parties, gymnastics and others. The **reconfigurability** of the meeting place could give an indication as to whether the meeting place could host different activities and be used permanently as another function desired by the residents or housing association. The question "Is the meeting place easy to reconfigure?" determined the reconfigurability of the meeting place.

It is currently unknown if factors such as the **size** and **shape** of the meeting place have any influence, but those characteristics were included in the checklist. Another important factor that could have an influence is the type of decorations that are present. It is known that certain colors and decorations can have an effect on the atmosphere of a room. The types of **decorations** that were included in the checklist are paintings on the wall, plants and green, bookshelves or none.

The survey included some experiences of the meeting place. The experiences that were included are the **accessibility, importance for social contacts, atmosphere** and **satisfaction with the atmosphere** interpreted by the respondents. These questions could be answered with the five-point Likert-scale. The final question was how often the respondent makes use of the meeting place and should be answered with the same scale as the social interaction questions.

The meeting place is most likely to have some sort of committee that organizes activities or events and is responsible for the meeting place. This information is not included within the survey due to the fact that respondents who do not participate or make use of the meeting place could indicate inaccurate results. Therefore, it was decided to conduct additional semi-structured interviews with the responsible member(s) of the residents' committee or other forms of organization. Some of the results could be included within the dataset and analyzed where possible. The semi-structured interview questions can be found in Appendix D.

Table 9: Physical environmental characteristics; meeting place variables

Meeting place Checklist	
Visibility of the meeting place	<input type="checkbox"/> Direction sign(s) <input type="checkbox"/> Entrance sign(s) <input type="checkbox"/> Visible from outside the complex <input type="checkbox"/> Visible from within the complex
Accessibility of the meeting place	<input type="checkbox"/> Stairs <input type="checkbox"/> Lift and stairs
Is the meeting place accessible for less mobile and disabled people?	<input type="checkbox"/> Yes <input type="checkbox"/> No
On which floor is the meeting place located?	<input type="checkbox"/> Ground floor <input type="checkbox"/> First floor <input type="checkbox"/> Second floor <input type="checkbox"/> Third floor <input type="checkbox"/> Higher than third floor
What is the size of the meeting place?	<input type="checkbox"/> 0 – 15 m ² <input type="checkbox"/> 16- 30 m ² <input type="checkbox"/> 31 – 45 m ² <input type="checkbox"/> 46 – 60 m ² <input type="checkbox"/> 61 – 75 m ² <input type="checkbox"/> 76 – 90 m ² <input type="checkbox"/> > 91 m ²
What form does the meeting place take?	<input type="checkbox"/> Square <input type="checkbox"/> Rectangle <input type="checkbox"/> Oval <input type="checkbox"/> Round <input type="checkbox"/> Triangle <input type="checkbox"/> T-shape <input type="checkbox"/> L-Shape <input type="checkbox"/> Other:
Is there natural daylight?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Which type of facilities are present in the meeting place?	<input type="checkbox"/> Toilet <input type="checkbox"/> Kitchen <input type="checkbox"/> Pantry <input type="checkbox"/> Sink <input type="checkbox"/> Bar <input type="checkbox"/> Table(s) <input type="checkbox"/> Desk(s) <input type="checkbox"/> Seating places <input type="checkbox"/> Entertainment (tv, board games, music, etc.) <input type="checkbox"/> Coffee/ tea equipment <input type="checkbox"/> Airconditioning <input type="checkbox"/> WIFI
For what type of activity is the place arranged?	<input type="checkbox"/> Relaxing <input type="checkbox"/> Study/ focus <input type="checkbox"/> Dining <input type="checkbox"/> Meetings <input type="checkbox"/> Parties <input type="checkbox"/> Other:
What type of decoration are present? (cozy environment)	<input type="checkbox"/> Paintings on the wall <input type="checkbox"/> Plants and green within the room <input type="checkbox"/> Bookshelves or other shelves <input type="checkbox"/> None
Is the meeting place easy to reconfigure?	<input type="checkbox"/> Yes <input type="checkbox"/> No

Table 10: Experiences meeting place

Meeting place survey questions:	
How do you experience the social accessibility of the meeting place?	<input type="checkbox"/> Very accessible <input type="checkbox"/> Accessible <input type="checkbox"/> Neutral <input type="checkbox"/> Inaccessible <input type="checkbox"/> Very inaccessible
How important is the meeting place for your social interactions with your fellow residents of the apartment complex?	<input type="checkbox"/> Very important <input type="checkbox"/> Important <input type="checkbox"/> Neutral <input type="checkbox"/> Unimportant <input type="checkbox"/> Very unimportant
How do you experience the atmosphere of the meeting place?	<input type="checkbox"/> Very pleasant <input type="checkbox"/> Pleasant <input type="checkbox"/> Neutral <input type="checkbox"/> Unpleasant <input type="checkbox"/> Very unpleasant
How satisfied are you with the atmosphere of the meeting place?	<input type="checkbox"/> Very satisfied <input type="checkbox"/> Satisfied <input type="checkbox"/> Neutral <input type="checkbox"/> Unsatisfied <input type="checkbox"/> Very unsatisfied

	Daily	2 – 3 times a week	Once a week	2 – 3 times a month	Once a month	Several times per half year	Several times per year	Rarely to never
How often do you use the meeting place?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.1.4. Loneliness scale & social interaction

The last part of the questionnaire focused on the feelings of loneliness and how to determine the score of the respondents. The first widely used loneliness scale is the one from the university of California, Los Angeles, the UCLA Loneliness Scale (Russell et al., 1978). This scale makes use of twenty questions that can be answered with four different experiences of feelings: “I often feel this way”, “I sometimes feel this way”, “I rarely feel this way” and “I never feel this way”. The scale is revised two times, once to make a shorter version with only six questions and once to create a reverse scored item (Russell, 1996).

There is also a loneliness scale that is developed by two Dutch researchers from the VU in Amsterdam (de Jong-Gierveld & van Tilburg, 1999). The developed scale has eleven questions that can be answered with “yes!”, “yes”, “more or less”, “no” and “no!”. This loneliness scale also has a shorter version with six questions, the same amount as the UCLA Loneliness scale (de Jong-Gierveld & van Tilburg, 2006). However, de Jong-Gierveld and van Tilburg stated that “*studies detailing the prevalence of loneliness, or in-depth studies of loneliness among certain individuals, as well as research into the changing nature and impact of loneliness after specific life events may benefit from using the 11-item scale*” (de Jong-Gierveld & van Tilburg, 2006).

As mentioned earlier, the CBS is working with the GGD and RIVM to get more insights in the loneliness scores in the Netherlands. They used the De Jong-Gierveld-scale for their research, because of the more conceptual framework and the multidimensional nature of the scale (van Beuningen et al., 2018). For that reason, this research also used the 11-item scale designed by De Jong-Gierveld. The scoring of the loneliness scale was done digitally, following the guideline published by the authors (de Jong-Gierveld & van Tilburg, 2006) and can be found in Table 11.

Table 11: Loneliness score based on 11-item scale

Questions		No!	No	More or less	Yes	Yes!
1.	There is always someone I can talk to about my day-to-day problems					
2.	I miss having a really close friend					
3.	I experience a general sense of emptiness					
4.	There are plenty of people I can lean on when I have problems					
5.	I miss the pleasure of the company of others					
6.	I find my circle of friends and acquaintances too limited					
7.	There are many people I can trust completely					
8.	There are enough people I feel close to					
9.	I miss having people around me					
10.	I often feel rejected					
11.	I can call on my friends whenever I need them					

The social interaction of the respondents is measured with the social interactions of their personal contacts. The interactions that are included are only based on the face-to-face contact of the respondents. The contacts could range from daily to not applicable and can be seen in Table 5. The frequency of the social contacts will determine the social interaction scores of the respondents. The people that are included within the social interactions are the partner, (grand)children, other family members, friends, residents of the building and other neighbors.

3.2. Data collection

The data is collected in Amsterdam and Diemen, the Netherlands, the locations are provided by the open source QGIS map that is published by the company RIGO. This research company works together with the government of the Netherlands and gathers the location data of meeting places designed for older adults to improve the social interactions and reduce the residents' feelings of loneliness.

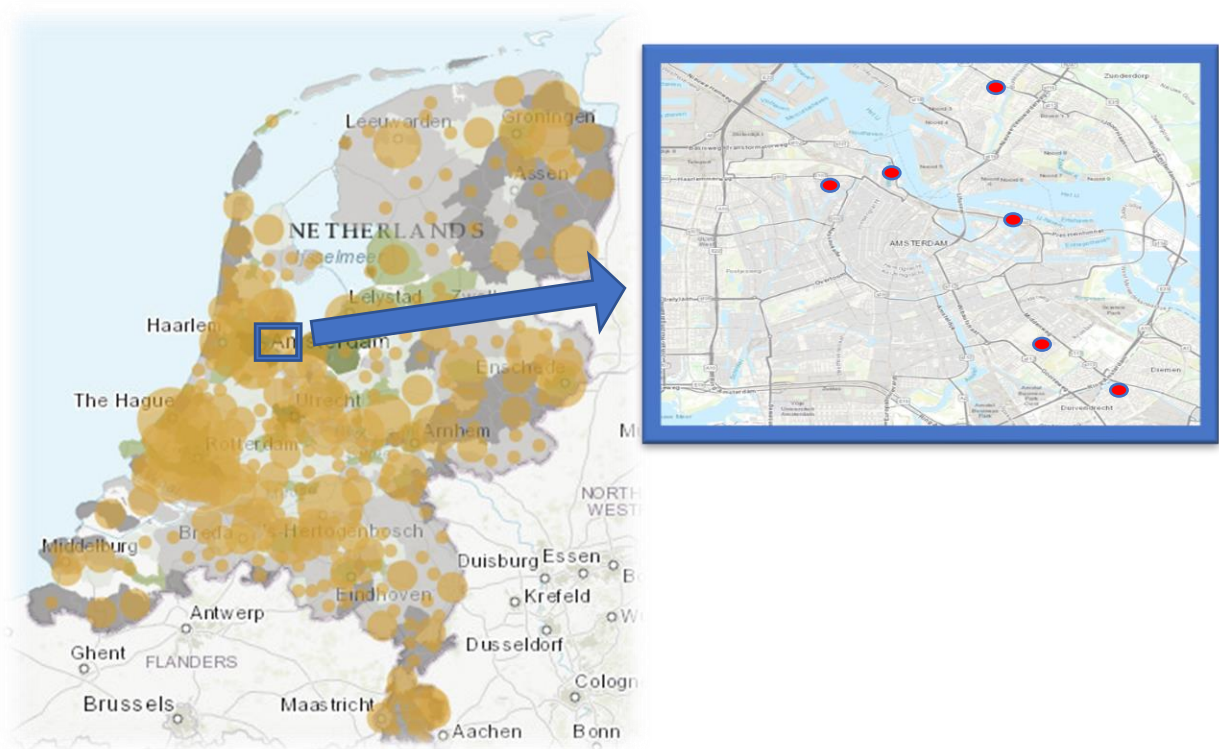


Figure 3: QGIS map of existing meeting places in the Netherlands and zoomed in on Amsterdam
Source: RIGO (2022)

There are a total of 60 locations in Amsterdam that have implemented meeting places and all of them are (currently) managed by six different social housing associations. A distinction of the locations was made based on the building characteristics that the apartments were located in medium/low-rise buildings. In this case only the complexes with a minimum of 30 and a maximum of 125 apartments were included, which reduced the number of locations to 16. The locations were approached through the housing associations by email and visited when there was no response. Eventually, six locations were included within the study (Figure 3). The locations are spread throughout the city of Amsterdam and are properties of various housing associations.

The data collection consisted of three parts. The first part was the questionnaire for the residents of the apartment complex. The second part was the checklist of the building and meeting place. The third part was an interview with a member of the residents' committee or a resident that is in contact with the housing association and small talks with residents of the apartment complexes when conducting the data collection.

The best possible approach for the questionnaire was determined in cooperation with the member of the residents' committee. A physical copy of the questionnaire was handed out so that the residents could fill it in and deposit it in a mailbox in the central hall. The survey could also be sent through an

email with a direct link to the questionnaire or as a physical copy with a written-out link and QR-code to direct the residents to the questionnaire. Reminders were sent by email (if possible) and with a physical (extra) QR-code form in the mailbox, one week after the initial hand-out or email. The data was collected from the end of July till the beginning of September 2022. The checklists and interviews were conducted on the six locations, and spread over the locations a total of 76 respondents completed the survey.

3.3. Data preparation and transformation

Some of the data needed preparation and/or transformation before it could be analyzed. The alternated variables are described below. Due to the fact that the questionnaire will be conducted in the Dutch language, the outcomes needed to be translated from Dutch to English. Another important aspect is that for future analysis most variables will need to be numeric. This will be done by transforming them and adding the labels to the different values.

The first set of variables that will be evaluated are the **personal characteristics**. The first variable that needed transformation is the year of birth. This variable needed to be transformed into the current **age** of the respondent. This was done by subtracting the birthyear from 2022 to get the current age of the respondent. Two respondents did not fulfill the minimum requirement of 65 years old. However, they were not excluded from participation. The numbers were categorized from (1) < 70, (2) 71 – 80 and (3) > 80. The **gender** outcomes could be female, male or do not wish to answer. In order to make the gender a dichotomous variable a transformation is needed for the respondents that wish not to identify their gender. Those respondents will be divided equally between the categories of female and male. In case of an uneven number the respondents will be assigned with the majority of the respondents. The **migration** outcomes will be transformed to a dichotomous level. Recoding was needed, since one outcome of the variable was 'do not wish to answer'. In this case the respondents will be assigned to the majority of the respondents from that specific location. The **level of education** will be transformed in three categories: low, middle and high level of education. Primary school or less and MAVO, VMBO or Lower vocational education were assigned to low level of education. Secondary vocational education and HAVO/VWO were assigned as middle level of education and Higher professional education and university bachelor/master were assigned as high level of education. For respondents who chose the option 'other' will be looked at the individual answer to place them in the right category. **Income** will be organized with the same categorization as education level. Income lower than 1.000 will be categorized as (1) low. Income level of 1.000 to 3.000 will be indicated as (2) middle and higher than 3.000 indicated as (3) high level of income. The people that did not wish to answer or do not know their level of income will be categorized in the low-income category. **Physical and mental health** will be recoded with a numerical scale from one (very poor physical/mental health) to five (excellent physical/mental health). The scores will not be combined, since both forms of health could have different influences and outcomes. The final personal characteristic is **volunteer work** and since the answer options are only 'yes' and 'no', there is no need to recode this variable.

The second set of variables that will be evaluated are the **socio-environmental characteristics**. The variables **partner status**, **(grand)children** and **friends** will be acquired by recoding the applicable personal contact questions. This will be done by recoding 'not applicable' to zero and all other frequency options with one to indicate that the respondent does have contact with them. The **neighborhood social cohesion** is in this case based on the residents of the six different complexes and not the entire neighborhood. For that reason, the neighborhood social cohesion will be adjusted to **building social cohesion**. The variable of satisfaction with the social contact with neighbors will be transformed into a 5-point scale and variable of the number of visits to and from the residents' neighbors in an 8-point scale. Since it is possible that respondents choose 'not applicable', a score of

zero will be added. The total score for building cohesion will be determined by combining the satisfaction of social contacts and both neighbor social interaction scores. A range between one and twenty-one points could be scored. The final step is the categorization; the scores of seven and below will be scored as (1) Low. Scores from eight to fourteen will be scores as (2) Middle and scores over fourteen will be scored as (3) High. The reliability and internal consistency within the scale needs to be assessed. This was done with the outcome of Cronbach's alpha and with a score of .670 it was determined that the neighborhood social cohesion is reliable.

Some characteristics of the **physical environment** will also need some preparation and transformation. The *environmental characteristics*: **presence of green, -facilities and -transportation methods** in the neighborhood will need to be recoded into three dichotomous variables with the options 'present' and 'not present'.

Some *building characteristics* will also need to be transformed. Starting with the **size of the community**, which indicates the number of apartments and is included within the location checklist. The numbers will be categorized into three categories: (1) <75, (2) 75 – 100 and (3) >100. Another building characteristic that needs to be categorized is the **low-/medium rise** building, which is indicated with the number of floors per location. There will be three categories: (1) 4 – 5, (2) 6 – 7 and (3) 8 – 9 floors.

The *characteristics of the meeting place* will require different forms of transformation. The **visibility** is based on four characteristics and each characteristic present will be scored with one point. The scores will be categorized as follows: (1) very poorly visible, (2) poor visible, (3) visible and (4) very visible. The **accessibility, location, shape, natural daylight** and **reconfigurability** of the meeting place are all variables that require recoding in a numerical value, in order to analyze them at a later stage. The **size** of the meeting place will be recoded into three categories: (1) < 50 m², (2) 50 – 100 m² and (3) > 100 m². The different **facilities** and **decoration** in the meeting place will be recoded into dichotomous variables (present or not present) to make them suitable for later analysis.

Experiences of the meeting place that were included within the survey were the **social accessibility, importance for social contacts, atmosphere** and **satisfaction with the atmosphere**. The social accessibility was transformed into two categories (1) social inaccessible and (2) social accessible. The reason for this transformation was that the categories were too small for further analysis otherwise. The categories very inaccessible, inaccessible and neutral were transformed into (1) social inaccessible and the categories accessible and very accessible were transformed into (2) social accessible. The other variables had some small categories as well and were transformed into three categories: (1) negative in the form of unimportant and unpleasant (2) neutral and (3) positive in the form of important and pleasant.

The outcomes of the interviews resulted in three variables that are included within the dataset. The first variable that was included is the **organizers of activities**. Two distinctions could be made between all locations and the responsibility of organizing activities: (1) residents' committee or (2) residents' committee and residents. Another distinction between the locations that could be made based on the interviews was the **availability of the meeting place**. Where some meeting places were (1) not available at any time and others were (2) available at any time. The final characteristic that could be distinguished was the **frequency of activities** that are organized in the meeting place. Three frequencies were found (1) twice a week, (2) once a week and (3) once a month. The variables give more insights in the social background and the involvement of residents and committees that support the social activities within the meeting place.

The **social interactions** are divided into two categories: **Social interaction with family and friends** and **social interaction with Neighbors**. Both types of interactions could be identified from daily contact to rarely or never any contact. The social interaction scores will be based on monthly social interactions as displayed in Table 5 in paragraph 3.1.2. The social interaction scores of partners, (grand)children, other family members and friends will be transformed to a combined score that presents the score of social interaction with family and friends. The social interaction scores of direct neighbors, indirect neighbors and visits from and to neighbors will determine the score for social interaction with neighbors. A combined total score was not taken into account, since it is possible that different social interactions weigh differently.

The social interaction with family and friends was checked for reliability and internal consistency. The Cronbach's alpha score is .578. This indicates that the internal consistency is qualified as "poor". The score can be increased when deleting the social interactions with a partner. The score would increase to .598, a minimal increase. The social interactions with neighbors were checked for reliability and internal consistency as well. The Cronbach's alpha score is .581. This indicates that the internal consistency is qualified as "poor". The score cannot be increased, since the deletion of certain items would only decrease the Cronbach's alpha score.

The **loneliness score** will be recoded according to the Manual of the Loneliness Scale (de Jong-Gierveld & van Tilburg, 2006). The 11-item statements will be recoded with scores and some questions need to be reconfigured to make all the statements have the same, positive or negative, outcome. In this case the outcomes of the statements 2,3,5,6,9 and 10 visible in Table 11 will be reconfigured. To make sure the reliability of the loneliness scale is internally consistent the scale was checked by the Cronbach's Alpha with an outcome of .878. This is qualified as 'Good'. Deletion of certain items would only generate a minor increase of the score. Therefore, no items will be deleted.

3.4. Conclusion

This chapter explained the operationalization of the research questions and the conceptual model. With regard to the operationalization, descriptions stated how the data was collected for each independent and dependent variable. The three different approaches were combined into one dataset for the variables where possible. The dataset was transformed and recoded where necessary, to prepare for further descriptive statistics and analysis, which will be discussed in Chapter 4 and 5. Other valuable information from the interviews and short conversations is included in Chapter 6.

The dataset contains six different locations with a total of 76 respondents that fully completed the survey. The physical characteristics of the neighborhood, building and meeting place that were gathered through the checklist were added to the dataset. The final additions to the dataset were made through the results of the interviews that were conducted with the residents' committee or other representative members of the apartment complex. Chapter 4 will discuss the data description after transformation, if necessary. Chapter 5 will discuss the results and findings and chapter 6 will discuss the interpretations of the results with literature and other studies taken into account. The report will be concluded with a conclusion that includes the main findings of this research.

4. Data description

With all the data collected and transformed where needed the first analysis of the data can be conducted in the form of descriptive statistics. In this chapter the personal, social-environmental, physical environmental characteristics will be visualized. As well as the social interaction scores of families and friends, and Neighbors.

4.1. Personal characteristics

This section describes the personal characteristics of the dataset. The characteristics that are included are age, gender, migration, education, income, physical health, mental health and volunteer work. Tables 12 and 13 show the outcomes of the survey for the personal characteristics of the respondents.

The distribution of the **age** among the respondents is 26.3% aged 70 or younger, 40.8% between 71 and 80 years old and 32.9% older than 80 years. The mean age of the respondents is 76.33 years. Regarding the **gender** of the respondents, it is noticeable that 73.7% were female and 26.3% identified themselves as male. Two respondents did not want to declare their gender and were evenly divided between the two genders. The distribution for the **migration background** is as follows; 19.7% of the respondents did have a migration background and 80.3% did not. Three respondents did not wish to declare whether they did or did not have a migration background and were categorized in line with their fellow residents on that location. The **education level** of 22.4% of the respondents was low, 46.1% had a middle education and 31.6% of the respondents had a high education level. Six respondents indicated that they had a different education background than stated and were individually recoded into their matching education category. Some respondents did not specify their education level and were assigned in the middle category. The **household income** was distributed as follows; 27.6% of the respondents had a low income, 65.8% had a middle income and 6.6% had a high income. Unfortunately, nineteen respondents did not wish to declare their level of income. The reasons behind this are unclear, but could be out of fear, shame or other reasons. Those respondents were categorized as a low. Regarding the **physical health** of the respondents, it is noticeable that only 3.9% of the respondents considered themselves to have excellent health. Very good health was stated by 9.2%, good health by 34.2%, fair health by 40.8% and poor physical health by 11.8% of the respondents.

Table 12: Descriptive statistics of personal characteristics; age, gender, migration background and education level

Personal characteristics	Sample (N)	Sample (%)	Level of measurement
Age			
< 70	20	26.3	Ordinal 3 groups
71 – 80	31	40.8	
> 80	25	32.9	
Gender			
Male	20	26.3	Nominal 2 groups
Female	56	73.7	
Migration background			
Yes	15	19.7	Nominal 2 groups
No	61	80.3	
Education level			
Low	17	22.4	Ordinal 3 groups
Middle	35	46.1	
High	24	31.6	

Mental health had a different distribution; 13.2% of the respondents considered themselves to have excellent mental health, 18.4%, reported very good mental health, 36.8% good mental health, 40.8% fair and 11.8% poor mental health. It is noticeable that the self-determined mental health was scored higher compared to the self-determined physical health. Over half of the respondents (64.5%) did not participate in any volunteer work, 35.5% of the respondents did. The final personal characteristic is **household composition**, where 21.1% lives with a partner and 78.9% lives independently.

Table 13: Descriptive statistics of personal characteristics; household income, physical- and mental health, volunteer work and household composition

Household income			
Low	21	27.6	Ordinal 3 groups
Middle	50	65.8	
High	5	6.6	
Physical health			
Excellent	3	3.9	Interval 5 groups
Very good	7	9.2	
Good	26	34.2	
Fair	31	40.8	
Poor	9	11.8	
Mental health			
Excellent	10	13.2	Interval 5 groups
Very good	14	18.4	
Good	28	36.8	
Fair	24	31.6	
Poor	0	0.0	
Volunteer work			
Yes	27	35.5	Nominal 2 groups
No	49	64.5	
Household composition			
Independent	60	78.9	Nominal 2 groups
Partner	16	21.1	

4.2. Socio-environmental

This section describes the socio-environmental characteristics of the data set. In this section the partner status, (grand)children, friends and building social cohesion will be discussed.

The distribution of the **partner status** differs from the household composition. Table 14 shows that 36.8% of the respondents has a partner and 63.2% does not have a partner. Compared to the household composition it can be stated that twelve respondents do have a partner but are not living together. Regarding the **(grand)children** the data shows that 68.4% of the respondents do have (grand)children. Twenty-four respondents (31.6%) do not have any (grand)children. The distribution of **friends** is as follows; 94.7% of the respondents did have friend(s) and 5.3% of the respondents did not have a friend. Since only four respondents indicated that they do not have any friends the variable will not be analyzed further, due to the lack of respondents in that category. The final socio-environmental characteristic is the **building social cohesion**. The building social cohesion is divided into three categories, where 40.8% scored low, 38.2% scored middle and 21.1% of the respondents scored high.

Table 14: Descriptive statistics of socio-environmental characteristics

Socio-environmental characteristics	Sample (N)	Sample (%)	Level of measurement
Partner status			
Partner	28	36.8	Nominal 2 groups
No partner	48	63.2	
(grand) children			
(grand) children	52	68.4	Nominal 2 groups
No (grand) children	24	31.6	
Friends			
Friends	72	94.7	Nominal 2 groups
No friends	4	5.3	
Building social cohesion			
Low	31	40.8	Ordinal 3 groups
Middle	29	38.2	
High	16	21.1	

4.3. Physical environmental

This section describes the physical environmental characteristics that were taken into account for each location. For a better understanding the physical environmental characteristics are divided on three levels: neighborhood, building and meeting place. Each subsection will take a closer look at the descriptive statistics of the collected data. The data was collected through a checklist and by means of interviews.

4.3.1. Neighborhood

The characteristics of the neighborhood that are taken into account is the presence of green, presence of facilities (daily shopping) and presence of transportation. The presence of these characteristics is assessed based on whether they are within walking distance for the older adults as mentioned in paragraph 3.1.3.

Table 15: Descriptive statistics of the physical environmental characteristics; neighborhood

Physical environmental characteristics	Sample (N)	Sample (%)	Level of measurement
Neighborhood			
Presence of green within walking distance			
Not present	10	13.2	Nominal 2 groups
Present	66	86.8	
Presence of facilities within walking distance			
Not present	30	39.5	Nominal 2 groups
Present	46	60.5	
Presence of transportation within walking distance: tram			
Not present	29	38.2	Nominal 2 groups
Present	47	61.8	

With regard to the **presence of green** within the neighborhood, 86.8% of the respondents considered a presence of green to be within walking distance. Only 13.2% of the respondents did not have a presence of green within walking distance of their apartment complex. Only one location in the dataset was without the presence of green. The **presence of facilities** for daily shopping was also checked for each location. The dataset indicated that 60.5% of the respondents does have facilities for daily

shopping within walking distance. On the other hand, 39.5% of the respondents did not have any form of daily shopping facilities within walking distance.

The **presence of transportation** was based on the car, bicycle, bus, tram and train. All locations and respondents did have access to a car, bicycle and bus. None of the locations were within walking distance of the train. The only difference was found with public transportation of the tram. The dataset showed that 61.8% of the respondents did have access to the tram and 38.2% did not have access to the tram within walking distance.

4.3.2. Building

The characteristics of the building that are taken into account are the size of the community, low-/medium-rise building (number of floors) and the common spaces within the apartment complex. Table 16 shows the results that were found and analyzed.

The **size of the community** is divided into three categories. The dataset showed that 53.9% of the respondents were living in an apartment complex with 75 or less apartments, 26.3% ranged between 76 and 100 apartments and 19.7% had more than 100 apartments within their complex. The **low-/medium-rise** was checked with the number of floors. The dataset showed that 46.1% of the respondents were located in apartment complexes with 4 – 5 floors, 39.5% 6 – 7 floors and 14.5% in 8 – 9 floors. The **common spaces** within an apartment complex consist of an entrance hall, corridors, parking garage, bicycle parking, laundry room and shared balcony. It was found that every location had horizontal corridors, an entrance hall for the lift and a separate staircase. Furthermore, the dataset showed that none of the locations had a laundry room or a parking garage within the complex. The dataset does show two common spaces that can be further analyzed and that are the shared balcony and bicycle parking. The data showed that 23.7% of the respondents does not have a shared balcony and 76.3% does have a shared balcony. For the bicycle parking it is noticeable that 89.5% of the respondents does have a shared bicycle parking in or around their complex and 10.5% does not.

Table 16: Descriptive statistics of physical environmental characteristics; building

Physical environmental characteristics	Sample (N)	Sample (%)	Level of measurement
<i>Building</i>			
Size of the community			
< 75 apartments	41	53.9	Ordinal 3 groups
76 – 100 apartments	20	26.3	
> 100 apartments	15	19.7	
Number of floors			
4 – 5 floors	35	46.1	Ordinal 3 groups
6 – 7 floors	30	39.5	
8 – 9 floors	11	14.5	
Commons spaces: shared balcony			
Not present	18	23.7	Nominal 2 groups
Present	58	76.3	
Common spaces: shared bicycle parking			
Not present	8	10.5	Nominal 2 groups
Present	68	89.5	

4.3.3. Meeting place

The characteristics of the meeting place that were taken into account are the visibility, size, accessibility, location (floor levels), shape, reconfigurability, natural daylight, decoration and facilities. Table 17 shows the descriptive statistics of these variables.

The **visibility** states how visible the meeting place is according to several characteristics for the residents of the apartment complex. The visibility ranges from very poorly visible with 26.3%, poorly visible 27.6%, good visible 10.5% and very good visible with 35.5% of the respondents' locations. The dataset showed that the **size** of the meeting place was recoded within three categories. In 15.8% of the respondents' location the size of the meeting place was less than 50 m². 40.8% of the respondent's location had a meeting place of between 50 and 100 m² and 43.4% of the respondents' location had a meeting place of over 100 m².

The **accessibility** informs about how the respondents reach the meeting place from inside the apartment complex. This is possible with stairs for 13.2% of the respondents' location or with the elevator and stairs for 86.8% of the respondents' location. The **location** of the meeting place is based on which floor level of the apartment complex the meeting place is located. Only two possible floor levels were found within the data. The meeting place was located on the ground floor in 59.2% of the cases and on the first floor for 40.8% of the respondents' locations. Within the data two different **shapes** of meeting places were found. The first and most common shape was a rectangular meeting place with 76.3% of the cases and a squared shape was found for 23.7% of the cases.

All meeting places did have **natural daylight** and therefore there is no further need to analyze this variable. **Reconfigurability** of the meeting place indicates whether the place is easily changed to another function. Only 13.2% of the respondents' meeting places did not have the reconfigurability to change into another function when necessary. On the other hand, a majority of 86.8% did have the option to reconfigure the meeting place. The **decoration** was divided in presence of plants, paintings and (book)shelves. The dataset showed that in 73.7% of the respondents' locations plants were present within the meeting place. For the paintings this percentage was 89.5% and for (book)shelves 52.6%. This indicates that in most locations there were different forms of decoration present.

The final variable from the dataset is the **facilities** that were present in the meeting place. The facilities that are included are kitchen, pantry, toilet, entertainment, WIFI and air conditioning. Regarding the kitchen, it can be noticed that 84.2% of the meeting places of respondents' locations did have a kitchen and 15.8% did not. Noticeable is that the location without a kitchen did have a pantry and one location had both. 53.9% of the respondents' meeting places facilitated a pantry. Regarding the bathroom facilities the data showed that 80.3% did have a toilet within the meeting place and 19.7% did not. Entertainment systems for music or videos were facilitated in 56.6% of the respondents' locations. WIFI however was present in many more meeting places with 85.5% of the respondents' locations. The final facility was air conditioning for warm and muggy days. Only 19.7% of the respondents' locations facilitated an air conditioning in the meeting place.

Table 17: Descriptive statistics of the physical environmental characteristics; meeting place

Physical environmental characteristics	Sample (N)	Sample (%)	Level of measurement
<i>Meeting place</i>			
Visibility			
Very poor	20	26.3	Ordinal 4 groups
Poor	21	27.6	
Good	8	10.5	
Very good	27	35.5	
Size			
< 50 m ²	12	15.8	Ordinal 3 groups
50 – 100 m ²	31	40.8	
> 100 m ²	33	43.4	
Accessibility			
Stairs	10	13.2	Nominal 2 groups
Lift and stairs	66	86.8	
Location (floor level)			
Ground floor	45	59.2	Nominal 2 groups
First floor	31	40.8	
Shape			
Rectangle	58	76.3	Nominal 2 groups
Square	18	23.7	
Reconfigurability			
No	10	13.2	Nominal 2 groups
Yes	66	86.8	
Decoration: presence of plants			
No	20	26.3	Nominal 2 groups
Yes	56	73.7	
Decoration: presence of paintings			
No	8	10.5	Nominal 2 groups
Yes	68	89.5	
Decoration: presence of (book)shelves			
No	36	47.4	Nominal 2 groups
Yes	40	52.6	
Facilities present: kitchen			
Not present	12	15.8	Nominal 2 groups
Present	64	84.2	
Facilities present: pantry			
Not present	41	53.9	Nominal 2 groups
Present	35	46.1	
Facilities present: toilet			
Not present	15	19.7	Nominal 2 groups
Present	61	80.3	
Facilities present: entertainment			
Not present	33	43.4	Nominal 2 groups
Present	43	56.6	
Facilities present: WIFI			
Not present	11	14.5	Nominal 2 groups
Present	65	85.5	
Facilities present: Air conditioning			
Not present	61	80.3	Nominal 2 groups
Present	15	19.7	

Experiences of the meeting place were included within the survey to get more insights in the experiences of the respondents. The importance of the meeting place, social accessibility, atmosphere and satisfaction with the atmosphere were included and are visible in Table 18.

The **importance of the meeting place** to the residents was found to be unimportant for 18.4% of the respondents. Slightly more (21.1%) respondents scored the importance as ‘neutral’ and 60.5% stated that the meeting place was important to them. The **social accessibility** indicates whether there is a social threshold for respondents to enter or join activities within the meeting place compared to other places or activities. The social accessibility has two categories. The meeting place was perceived as; socially inaccessible by 35.5% of the respondents meaning that survey respondents found it more difficult to join activities or meetings. Socially accessible was experienced by 64.5% of the respondents, indicating that they found the meeting place socially accessible when joining activities or meetings. The **atmosphere of the meeting place** ranged from unpleasant to pleasant. Table 18 shows that 7.9% of the respondents indicated the meeting place had an unpleasant atmosphere. A neutral atmosphere by 35.5% and a pleasant atmosphere 56.6% of the respondents experienced a pleasant atmosphere. The **satisfaction with the atmosphere** in the meeting place was ranged from unsatisfied to satisfied. Of the respondents, 10.5% were unsatisfied, 34.2% were neutral and 55.3% of the respondents were satisfied with the atmosphere.

Table 18: Descriptive statistics of the experiences of the meeting place

Social characteristics of the meeting place	Sample (N)	Sample (%)	Level of measurement
Importance to the residents			
Unimportant	14	18.4	Ordinal 3 groups
Neutral	16	21.1	
Important	46	60.5	
Social accessibility			
Social inaccessible	27	35.5	Ordinal 2 groups
Social accessible	49	64.5	
Atmosphere			
Unpleasant	6	7.9	Ordinal 3 groups
Neutral	27	35.5	
Pleasant	43	56.6	
Satisfaction with the atmosphere			
Unsatisfied	8	10.5	Ordinal 3 groups
Neutral	26	34.2	
Satisfied	42	55.3	

4.4. Loneliness score

The loneliness score of the respondents consists of the emotional and social loneliness scores combined. In both cases, scoring the lowest points is the most positive outcome and indicates that the respondents do not feel emotionally or socially lonely.

The emotional loneliness score shows the range of scores of the respondents (Figure 4). It is striking to see that 14.5% of the respondents scored the maximum in all statements and therefore do not have any feelings of emotional loneliness. Keeping in mind that the scores can have a range from 6 to 30 it can be concluded that 50.0% of the respondents had a score between 19 and 24 and can be identified as 'moderate emotional lonely'. The social loneliness scores (ranged 5-25) give a different perspective on the loneliness scores. No respondents reported the highest social loneliness scores. Striking is that 71.1% of the respondents can be identified as 'moderate social lonely'. This percentage is much higher compared to the emotional loneliness.

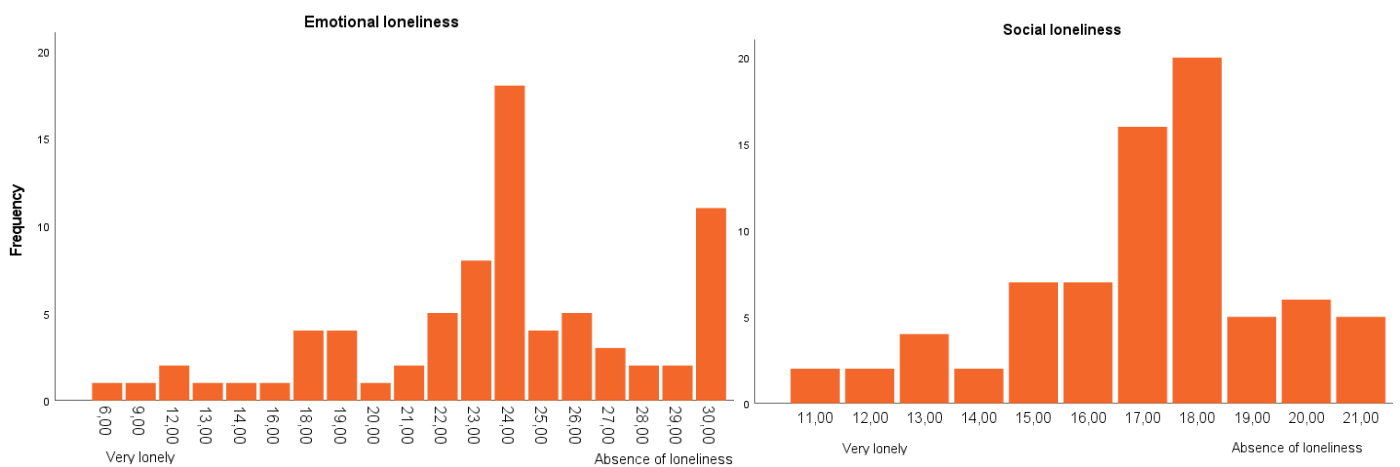


Figure 4: Emotional and Social loneliness scores

The social and emotional loneliness scores combined (Figure 5) results in the overall loneliness scores. The scores show a wide variety, and it can be concluded that only one respondent (1.3%) scored 'very sever lonely' (11-21). There were 7.9% of the respondents scored 'severe lonely' (22-32). The category that applies for most of the respondents (48 and 61.8%) is 'moderate lonely'. The highest category 'not lonely' was identified for 29.0% of the respondents.

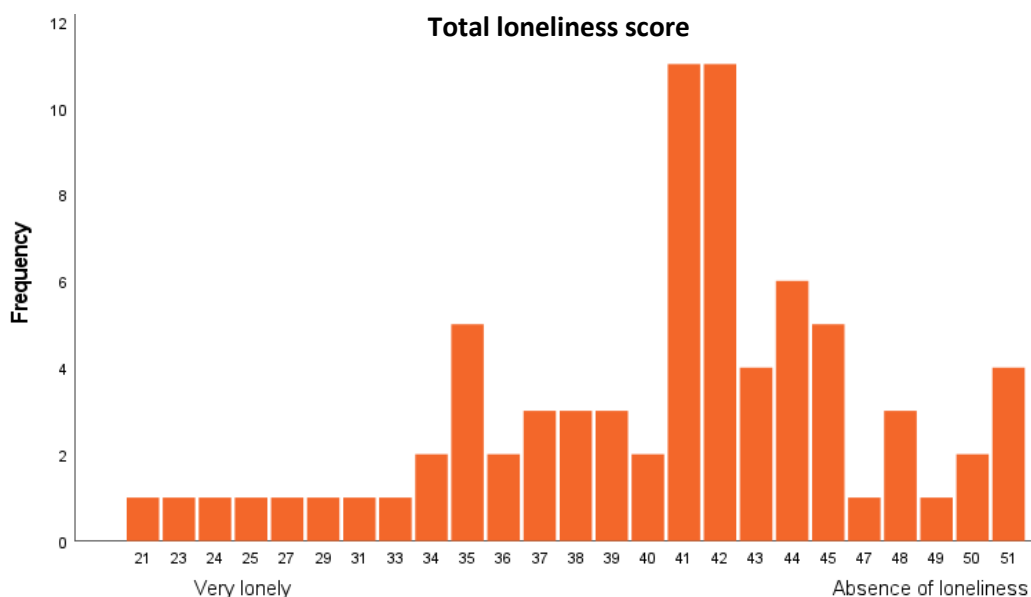


Figure 5: Overall loneliness scores

4.5. Social interaction

The social interaction scores are divided into two categories social interaction with family and friends and social interaction with neighbors. The social interaction scores are based on monthly social interaction in both cases and will be described further in this section.

4.5.1. Social interaction family and friends

The social interaction with family and friends is based on four social interactions scores: partner (grand)children, other family and friends. As mentioned in paragraph 3.3 the scores were combined to create one social interaction score for family and friends. Figure 6 shows the outcomes of the social interaction with family and friend scores of the respondents.

The social interaction score with family and friends did not show a normal distribution and needed transformation to make the variable usable for further analysis. The data showed a positive skew (right skew) and got a square root transformation in SPSS as is visible in Figure 6.

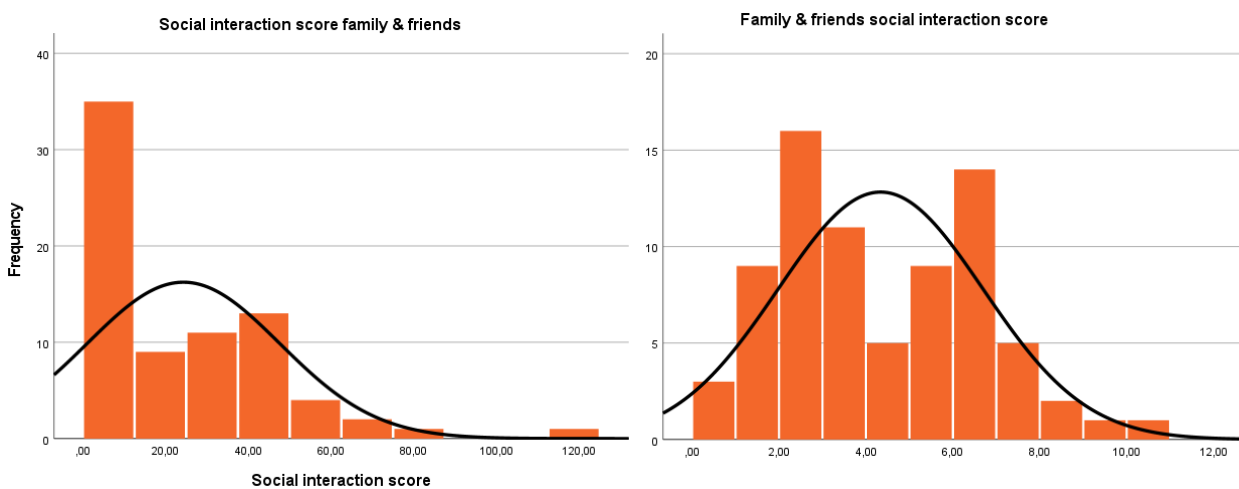


Figure 6: Social interaction score family and friends before (left) and after (right)

4.5.2. Social interaction with neighbors

The social interaction with neighbors is based on four social interactions that the respondents could have with their direct and indirect neighbors. The four social interactions that were taken into account are described in paragraph 3.3. The social interaction with neighbors did also not show a normal

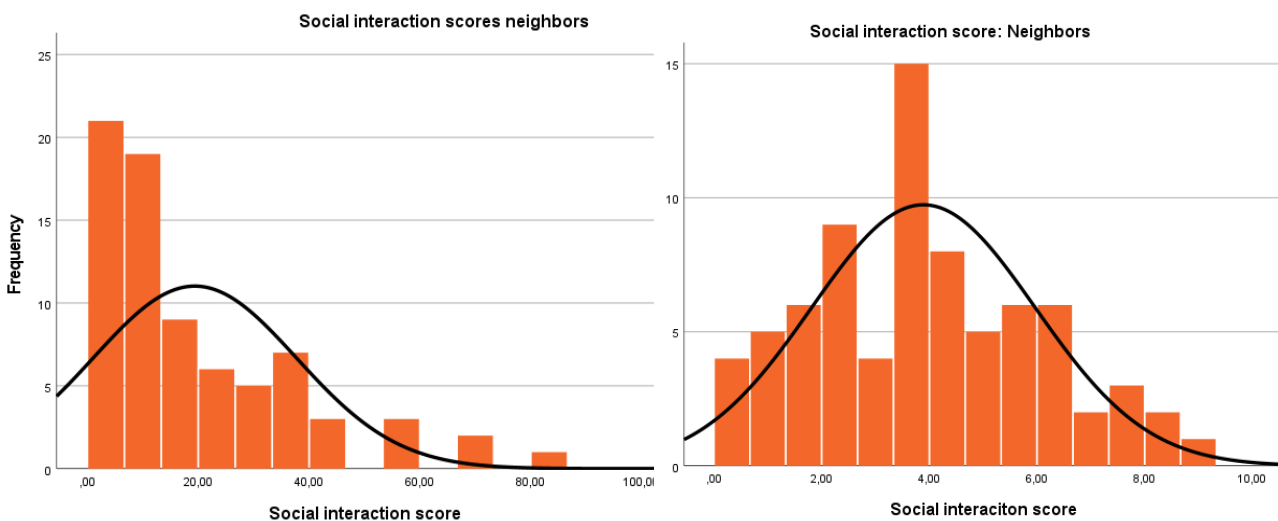


Figure 7: Social interaction score neighbors before (left) and after (right)

distribution and needed some transformation. Figure 7 shows the positive skew (right skew) that needed transformation in order to be used in further analysis. To achieve this the data was transformed with a square root in SPSS, which is in line with the transformation that was conducted for the social interaction.

4.6. Interviews with residents' committees

Additional to the surveys, interviews were conducted with the person(s) responsible for the meeting place of each location, to obtain insights into the social aspects of the meeting place. The contact information was received from either the housing association or the residents of the complex. The locations that were visited all had some form of residents committee that organized the social events and interactions within the meeting place. Some of them were officially registered and could be compared to an owner association, while others were individuals who took the initiative for frequent contact with the neighbors in the meeting place. This paragraph will give insight in the results of the interviews that were conducted for every location. These insights give the possibility to add certain social characteristics variables to the dataset and further analyze those, in order to identify if these characteristics have a significant relation with the feelings of loneliness and the social interaction with family and friends, and neighbors.

First of all, it was remarkable that the meeting places differed from initial commissioning. The oldest meeting place was first occupied when the building was completed around 1995. The meeting place was one of the apartments that would not function as residence, but as a place where neighbors of the complex could meet each other. The meeting places in other locations were mostly realized between 2010 and 2017. The newest meeting place dates from 2020 and was previously commissioned as a residential apartment. In consultation with the residents and the housing association, the apartment would be used as a meeting place for the complex.

According to the interviews, in most cases the residents' committee is responsible for the meeting place and its usage. The committee is in close contact with the housing association, for example in case of damages and defects. Minor maintenance and keeping the meeting place clean and organized is mostly the responsibility for all residents who make use of the place. It was stated that some locations did not have an official residents' committee, due to the fact that it requires registration with the chamber of commerce and other related obligations. One other option is used and that is an outside board that is responsible for the meeting place.

In most cases the residents' committee is responsible for the **organization of activities**. However, in all cases the residents of the apartment complex can take the initiative for a certain activity, by putting their idea on a board or in a mailbox. The scheduled activities are shared by e-mail and/or are posted on the bulletin board in the main hallway. Some activities require registration or notification in advance, but this is mainly when purchases need to be made. Most of the activities are on a walk-in basis, where everyone can join whenever they like.

The **frequency of the activities** ranges from monthly to twice a week. With once a month being the lowest frequency, it can be stated that most of the meeting places are often used by the residents of the apartment complex. Some locations even share their meeting place with people from outside the complex and some housing associations rent the location out to other parties. Overall, the residents still have priority over external groups or companies. Since there were differences found within the frequency of activities, this variable was included into the further analysis and can be found in Table 19.

A wide range of activities were and are organized. For example playing games, having diner, drinks, meetings and parties. Other less frequently named activities were watching movies, meditation, cultural events, painting, lectures, crafting, playing music and discussing books. The range of activities differ, and new initiatives are always welcome, according to all interviewees. In some meeting places even Christmas dinners and other parties were being organized.

The **availability of the meeting place** is not the same for every location. In the surveys accessibility was taken into account with respect to the floor level, but in this case the access refers to the ability for the residents to use the space at any time they prefer. In four interviews, the interviewees stated that the residents do not have access to the meeting place at any time. This indicates that the meeting place is not always available and can be opened with a key that is in possession of the committee. With communication and coordination, the meeting place is opened when needed. The other locations indicated that the meeting place is always accessible for residents and that every resident has a key or that the meeting place will not be closed, since it is located within the complex. For instance, one of the interviewees explained:

“The meeting place is not always accessible, and residents need to communicate when they would like to make use of the room. Through clear communication and joining the scheduled activities the housing association is able to partially rent it out for a number of days. Beneficial for both parties!”

The accessibility of the meeting place was previously taken into account as a physical characteristic, but this availability describes if the meeting place is actually available at any time for the residents of the apartment complex. Therefore, the variable will be further analyzed through an independent samples t-test to see if it shows a significance with the three dependent variables and can be found in Table 19.

The goal of the meeting place is the same for every location: getting neighbors in contact with each other. This sounds like an achievable goal, but in many locations the interviewees experienced that it could be hard to attract residents to the meeting place. Personal invitations and/or reminders are commonly used to attract the residents, but it is impossible and undesirable to force people out of their apartments and include them in the social interactions in the meeting place. However, the interviewees felt that residents enjoy the social interaction with their neighbors and find it a very pleasant experience. Therefore, the meeting place achieves its goal, according to the interviews, by stimulating the social interactions among the residents of the complex. The interviewees stated the following.

“The most important aspect is the social interactions with the neighbors in the meeting place. We will stimulate those interactions by organizing many activities and encourage all the residents to join, but there will always be some people that are not interested.”

“The meeting place can have all the features and best stuff in the world, but without good companion and activities the meeting place will not facilitate any social interactions with the residents and their fellow neighbors.”

The interviews provided additional data that could be integrated within the dataset. The variables that were integrated are: organizer of the activities within the meeting place, accessibility at any time and the frequencies or organized activities.

The data collected through the interviews are based on social characteristics of each locations meeting place. The descriptive statistics of the included variables are visible in table 19. In all cases the (unofficial) residents' committee were responsible for organizing activities in the meeting place. For some locations the organization was also in cooperation with the residents. The frequency of the activities could be categorized as follows; (1) twice a week, (2) once a week and (3) once a month. After analysis, it was discovered that three locations organized activities twice a week, two locations once a week and one location once a month. It was noticed that not all meeting places are accessible at any moment for the residents of the apartment complexes. The interviews showed that the meeting places were not accessible at any given time for four locations and that the meeting places were accessible at any time for two locations.

Table 19: Descriptive statistics of the variables derived from the interviews

Output from the interviews	Sample (N)	Sample (%)	Level of measurement
Organizes activities			
Residents' committee	32	42.1	Nominal 2 groups
Residents' committee and residents	44	57.9	
Availability of the meeting place			
Not accessible at any time	50	65.8	Nominal 2 groups
Accessible at any time	26	34.2	
Frequency of activities			
Twice a week	42	55.3	Ordinal 3 groups
Once a week	28	34.2	
Once a month	8	10.5	

4.7. Conclusion

In this chapter the data from the survey, checklist and interviews were described and visualized. The dataset contained twenty-seven independent variables that are divided into personal characteristics, socio-environmental characteristics and physical environmental characteristics. The dependent variable 'feelings of loneliness' showed a relatively normal distribution and did not needed transformation. The dependent variables 'social interaction family and friends', and social interaction 'neighbors' showed a right skew and were both transformed with a square root.

The interviews and small talks gave insights into the organization in the form of residents' committees that take responsibility for the organization and use of the meeting place. The variables organizes activities, availability of the meeting places and frequency of activities was added to the dataset.

The next chapter will present the results from the bivariate analysis that was performed in order to analyze the variables and look for significant relations among the independent and dependent variables and to answer the research questions.

5. Results and findings

In this chapter the bivariate analysis that were performed will be briefly explained. The statistical tests used in this chapter are the independent samples t-test, one-way ANOVA and the Pearson product-moment correlation coefficient. The independent samples t-test were conducted for the nominal independent variables with two categories (groups). The one-way ANOVA tests were used for nominal and ordinal independent variables with more than two categories (groups). The Pearson product-moment correlation coefficient was used to measure the linear correlation between two sets of data. The results will be discussed in the paragraphs of this chapter. Paragraph 5.1 shows the results of the bivariate analysis for the personal characteristics. Paragraph 5.2 shows the results of the analysis for the socio-environmental characteristics. Paragraph 5.3 indicates the results of the analysis for physical environmental characteristics divided into neighborhood, building and meeting place level. Paragraph 5.4. indicates the results of the dependent variables and their correlation. This chapter will be concluded in paragraph 5.5 with an overview of the found significances and their positive or negative relation. Outcomes of the bivariate analysis with a p-value lower than .05 are considered significant and are highlighted in green. The outcomes with a p-value lower than .10 are highlighted in light green.

5.1. Personal characteristics

The tests that were conducted to investigate whether there are differences in loneliness and social interaction scores between the different groups are independent samples t-test and one-way ANOVA. This paragraph shows the outcomes of the personal characteristic's variables in relation with the three dependent variables: loneliness, social interaction family and friends and social interaction neighbors. Table 20 shows the independent samples t-test with the corresponding t-value, N-value, mean and standard deviation. Table 21 displays the outcomes of the one-way ANOVA with the corresponding F-value, N-value, mean and standard deviation.

Regarding the **gender** of the respondents, Table 20 exhibits that female respondents reported a significantly lower loneliness score ($p=.015$), which indicates that female respondents are more likely to feel lonely compared to male respondents. **Migration background** does not seem to have an effect on the loneliness score and both social interaction scores. The respondents that do participate in **volunteer work** or other forms of community services tend to feel less lonely compared to the respondents who do not participate in such activities. This positive effect was also found in both social interaction scores, which indicates that respondents who are working as a volunteer have more social interaction with their family and friends and their neighbors. The **Household composition** outcomes indicate that respondents who currently live together with their partner experience less feelings of loneliness compared to respondents who live independently. The social interaction with family and friends is much higher and is likely caused by the fact that respondents who live together see their partners on a daily basis. The social interaction with neighbors is also positively affected when respondents live with their partner, but this association is only slightly significant ($p=.057$).

Table 20: Personal characteristics independent Samples t-test

		Absence of loneliness		Social interaction Family & Friends		Social interaction Neighbors	
Gender		<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>
		2.486	.015	-1.539	.128	-1.141	.258
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Male	20	43.35	5.31	5.03	2.44	4.34	2.35
Female	56	39.30	6.54	4.09	2.31	3.73	1.97
Migration background		<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>
		1.321	.190	1.028	.318	.049	.961
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Yes	15	42.33	5.91	5.02	3.03	3.91	1.91
No	61	39.89	6.54	4.17	2.17	3.88	2.13
Volunteer work		<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>
		2.209	.030	3.404	.001	2.657	.010
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Yes	27	42.52	6.33	5.50	1.94	4.71	1.99
No	49	39.18	6.28	3.70	2.35	3.44	2.00
Household composition		<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>
		-2.481	.015	-5.427	.000	-1.933	.057
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Independent	60	39.45	6.62	3.69	2.07	3.66	1.96
With partner	16	43.81	4.52	6.76	1.79	4.77	2.33

Table 21 shows that **Age** has no significant effect on the level of loneliness ($p=.173$), neither has social interaction with family and friends ($p=.295$). Age does show a significant effect on the level of social interactions with neighbors ($p=.020$). Respondents in higher age categories reported lower social interactions with neighbors. The effect of **Education level** on the level of loneliness is slightly significant as well ($p=.054$). Since the p-value is below 0.1 it can be stated with some caution that respondents with a higher level of education experienced less loneliness. The level of education did not have a significant effect on the social interaction with family and friends but did show to have a positive influence on the social interaction with neighbors ($p=.033$). The respondents with a middle or higher level of **income** reported significantly higher feelings of loneliness. This indicates the higher the level of education is the lower the feelings of loneliness will be. The level of income also has a significant effect on the social interaction with family and friends. Respondents with a higher income likely reported better social interaction with family and friends.

Table 21: Personal characteristics ANOVA

		Absence of loneliness		Social interaction Family & Friends		Social interaction Neighbors	
Age		F	Sig.	F	Sig.	F	Sig.
		1.799	.173	1.241	.295	4.155	.020
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
<70	20	40.50	8.20	4.45	2.30	3.93	1.50
71 – 80	31	41.77	5.21	4.74	2.51	4.57	2.22
80 >	25	38.52	6.09	3.75	2.20	3.02	2.03
Education		F	Sig.	F	Sig.	F	Sig.
		3.040	.054	1.611	.207	3.592	.033
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Low	17	37.29	7.20	3.45	1.87	2.85	1.96
Middle	35	40.63	4.70	4.66	2.66	4.43	1.89
High	24	42.17	7.54	4.50	2.14	3.84	2.20
Income		F	Sig.	F	Sig.	F	Sig.
		5.669	.005	5.153	.008	.075	.928
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Low	21	37.19	6.66	3.75	2.40	3.88	1.95
Middle	50	41.10	6.01	4.28	2.19	3.93	2.19
High	5	46.40	3.65	7.32	2.06	3.55	1.60
Physical health		F	Sig.	F	Sig.	F	Sig.
		4.404	.003	.640	.636	.741	.567
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Excellent (5)	3	49.67	2.31	5.38	2.76	4.30	0.34
Very good (4)	7	44.29	4.54	4.70	2.37	4.41	3.05
Good (3)	26	40.92	5.34	4.64	2.14	3.95	1.84
Fair (2)	31	39.58	5.12	3.84	2.49	3.47	2.11
Poor (1)	9	35.33	10.46	4.56	2.63	4.63	2.11
Mental health		F	Sig.	F	Sig.	F	Sig.
		4.999	.003	2.481	.068	1.317	.275
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Excellent (5)	10	46.20	3.97	5.70	1.97	3.49	1.33
Very good (4)	14	42.36	4.91	4.80	2.27	4.86	2.30
Good (3)	28	38.86	6.45	3.55	1.92	3.66	2.12
Fair (2)	24	38.54	6.64	4.42	2.78	3.76	2.09
Poor (1)	0						

Physical health is significantly related with the feelings of loneliness. Respondents with self-reported lower mental health stated lower loneliness scores as well. It is notable that mental health was not significant with both social interaction scores. However, **Mental health** seemed to have a slightly significant effect ($p=.068$) on social interaction with family and friends. Better physical health resembles more social interaction with family and friends, although it cannot be explained why the respondents that answered “good” had a remarkably lower score compared to the other categories. Physical health also has a significant effect on the dependent variable of loneliness. This is in line with the mental health, the lower the physical health was determined the lower the loneliness score is. To investigate whether there is a correlation between mental and physical health a Pearson’s Rho correlation was conducted. Table 22 shows that there is a positive correlation ($r=.670$) between the two health variables.

Table 22: Mental- and physical health correlation with Pearson’s Rho

	Mental health		Physical health	
Pearson’s Rho correlation	r	Sig. (2-tailed)	r	Sig. (2-tailed)
Mental health			.670	.000
Physical health	.670	.000		

5.2. Socio-environmental characteristics

With regard to socio-environmental characteristics, the results show that respondents who do not have a **partner** reported significantly lower scores on all three dependent variables. It is possible that some respondents do have a partner but are currently not living together. The results also show that when a respondent does not have a partner, the loneliness and social interaction scores are significantly lower compared to the respondents that do have a partner. Having **(grand)children** is significantly related to higher social interactions with family and friends. This is caused by the fact that this was taken into account when measuring the social interaction scores. For the other dependent variables having (grand)children is not significantly related. The independent variable **Friends** was excluded from the analysis since only four respondents indicated that they did not have any friends.

Table 23: Socio-environmental characteristics independent Samples t-test

		Absence of loneliness		Social interaction Family & Friends		Social interaction Neighbors	
Partner		t	Sig. (2-tailed)	t	Sig. (2-tailed)	t	Sig. (2-tailed)
		-2.297	.024	-8.053	.000	-1.767	.084
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
No partner	48	39.10	6.66	3.10	1.68	3.54	1.73
Partner	28	42.54	5.57	6.46	1.79	4.48	2.48
(grand) Children		t	Sig. (2-tailed)	t	Sig. (2-tailed)	t	Sig. (2-tailed)
		-.871	.386	-2.465	.016	.025	.980
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
No (grand)children	24	39.42	6.26	3.39	2.23	3.90	1.62
(Grand)children	52	40.81	6.56	4.78	2.31	3.89	2.27

As expected, **building social cohesion** had a significant effect on the social interaction with neighbors. A higher building social cohesion is related to more social interactions with neighbors. There was no significant effect found on building social cohesion and the feelings of loneliness and social interaction with family and friends.

Table 24: Socio-environmental characteristic ANOVA

		Absence of loneliness		Social interaction Family & Friends		Social interaction Neighbors	
Building social cohesion		F	Sig.	F	Sig.	F	Sig.
		1.672	.195	.597	.553	20.076	.000
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Low	31	38.90	6.90	4.04	2.53	2.75	1.68
Middle	29	40.83	5.97	4.39	2.13	3.91	1.59
High	16	42.38	6.15	4.83	2.48	6.05	1.88

5.3. Physical environmental characteristics

As previously explained, physical environmental characteristics are divided in three levels: characteristics of the environment, building and meeting place. In that order the results will be reviewed and taken into account.

5.3.1. Neighborhood

The environmental level covers the presence of green, presence of daily shopping facilities and transportation methods as Table 25 displays. The **presence of green** within walking distance was not significantly related with any of the dependent variables. This indicated that the presence of green within walking distance does not have an influence on the feelings of loneliness and the social interaction scores. The **presence of daily shopping facilities** was also found to have no significant association with the dependent variables. The last environmental variable was the **presence of transportation methods**. The transportation methods in and around the locations did not differ as much as expected. All locations did offer transportation by bike, car and public transport with the bus. Therefore, the tram was the only transportation method included and showed no significance with the dependent variables.

Table 25: Independent Samples t-test Environmental characteristic

		Absence of loneliness		Social interaction Family & Friends		Social interaction Neighbors	
<i>Presence of green < 400 m</i>		<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>
		.909	.367	.797	.444	.112	.911
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Not present	10	42.10	5.86	5.11	3.45	3.96	1.81
Present	66	40.11	6.55	4.22	2.17	3.88	2.12
<i>Presence of daily shopping facilities < 400 m</i>		<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>
		1.089	.280	.557	.579	-1.563	.122
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Not present	30	41.37	5.03	4.53	2.76	3.43	2.37
Present	46	39.72	7.22	4.21	2.09	3.43	2.37
<i>Presence of public transportation: tram < 400 m</i>		<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>
		.925	.358	1.013	.314	1.550	.126
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Not present	29	41.24	6.59	4.69	2.47	4.32	1.62
Present	47	39.83	6.39	4.12	2.29	3.62	2.29

5.3.2. Building

The building characteristics that were included in the analysis were the number of floors, apartments and the common spaces within the complex. The **number of floors** and **number of apartments** were not significantly related to the loneliness and the social interaction scores of family and friends. The number of floors does seem to have a slightly positive significant ($p=.077$) effect on the social interaction with neighbors as is displayed in Table 26. This indicates that the higher the complex the more social interaction with neighbors takes place.

Table 26: Building characteristics ANOVA

		Absence of loneliness		Social interaction Family & Friends		Social interaction Neighbors	
<i>Number of floors</i>		<i>F</i>	<i>Sig.</i>	<i>F</i>	<i>Sig.</i>	<i>F</i>	<i>Sig.</i>
		Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
	N						
4 – 5	35	39.86	6.86	4.36	2.18	3.91	1.86
6 – 7	30	41.37	5.03	4.53	2.76	3.43	2.37
8 – 9	11	39.27	8.61	3.77	1.76	5.08	1.41
<i>Number of apartments</i>		<i>F</i>	<i>Sig.</i>	<i>F</i>	<i>Sig.</i>	<i>F</i>	<i>Sig.</i>
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
< 75	41	40.80	6.14	4.32	2.53	3.88	2.26
76 - 100	20	40.40	6.79	4.05	2.04	3.82	1.59
> 100	15	39.13	7.14	4.76	2.37	4.02	2.23

The types of **common spaces** that locations could have had were an entrance hall, corridor, garden, balcony, laundry room, bicycle parking, garage and dedicated meeting place. Since all locations had an entrance hall, corridors, dedicated meeting place and none of the locations had a garage, garden or laundry room, only two places were taken into account, namely the shared balcony and bicycle parking. Remarkably, the presence of a shared balcony and bicycle parking had a slightly significant ($p=.061$ and $p=.085$) effect on social interaction with family and friends as is displayed in Table 27. The absence of a shared balcony and shared bicycle parking in the apartment complex has a positive effect on the social interaction between family and friends. A possible explanation for this odd outcome cannot be given.

Table 27: Building characteristics independent samples t-test

		Absence of loneliness		Social interaction Family & Friends		Social interaction Neighbors	
<i>Shared balcony</i>		<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>
		Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
	N						
Not present	18	42.44	4.89	5.25	2.72	3.85	1.60
Present	58	39.72	6.78	4.05	2.19	3.90	2.21
<i>Shared bicycle parking</i>		<i>t</i>	<i>Sig. (2-tailed)</i>	<i>T</i>	<i>Sig. (2-tailed)</i>	<i>T</i>	<i>Sig. (2-tailed)</i>
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Not present	8	42.88	3.68	5.42	1.61	3.72	1.39
Present	68	40.07	6.67	4.21	2.41	3.91	2.15

Furthermore the average absence of loneliness, social interaction with family and friends, and neighbors was measured to see the differences between the six locations. The results are displayed in Table 28.

Table 28: Location and their average feelings of loneliness and social interaction scores

Location	Average absence of loneliness score	Average social interaction score family and friends	Average social interaction score neighbors
1	42.10	5.11	3.96
2	42.88	5.42	3.72
3	39.27	3.77	5.08
4	38.75	3.14	3.89
5	39.13	4.76	4.02
6	41.00	4.23	3.17

Location 2 scored the highest absence of loneliness score and the highest social interaction score with family and friends. This indicates that on average the older adults of apartment complex location 2 feel the least lonely and have the highest social interactions with their family and friends. The average social interaction score with neighbors was scored the highest in location 3. This indicates that the older adults of apartment complex 3 have on average the most frequent contact with their neighbors compared to the other locations.

5.3.3. Meeting place

The meeting place characteristics that were taken into account and would have a potential influence on the feelings of loneliness and social interactions are described in this paragraph. Table 29 shows that the **visibility** of the meeting place does not show any significance with the feelings of loneliness and both social interaction scores. The **size** of the meeting place shows a positive relation with social interaction with family and friends. The larger the meeting place, the higher the number of social interactions with the respondent's family and friends. There was no significant effect found between the size of the meeting place and feelings of loneliness and social interaction with neighbors.

Table 29: Meeting place characteristics ANOVA

		Absence of loneliness		Social interaction Family & Friends		Social interaction Neighbors	
<i>Visibility</i>		<i>F</i>	<i>Sig.</i>	<i>F</i>	<i>Sig.</i>	<i>F</i>	<i>Sig.</i>
		.898	.446	.709	.550	1.566	.205
	<i>N</i>	<i>Mean</i>	<i>Std. Dev</i>	<i>Mean</i>	<i>Std. Dev</i>	<i>Mean</i>	<i>Std. Dev</i>
Very poorly	20	41.00	4.68	4.23	2.40	3.17	2.61
Poorly	21	40.62	7.39	4.41	2.71	4.55	1.67
Good	8	42.88	3.68	5.42	1.61	3.72	1.39
Very good	27	38.96	7.37	4.04	2.26	3.96	2.00
<i>Size</i>		<i>F</i>	<i>Sig.</i>	<i>F</i>	<i>Sig.</i>	<i>F</i>	<i>Sig.</i>
		.499	.609	3.348	.041	.011	.989
	<i>N</i>	<i>Mean</i>	<i>Std. Dev</i>	<i>Mean</i>	<i>Std. Dev</i>	<i>Mean</i>	<i>Std. Dev</i>
< 50 m2	12	38.75	7.97	3.14	1.80	3.89	1.76
50 – 100 m2	31	40.39	6.27	4.07	2.17	3.85	2.42
> 100 m2	33	40.94	6.15	5.03	2.54	3.93	1.88

Accessibility, location (which floor) and **reconfigurability** (possibility to transform the meeting place in another functional space) of the meeting place did not show any relation with the three dependent variables. The **shape** of the meeting place, however, did show a slightly significant difference ($p=.061$) with social interaction with family and friends. This indicates that a rectangular meeting place is

associated with less social interaction with family and friends compared to squared meeting places. Noticeable is that the shape of the meeting place is not related with the feelings of loneliness and social interaction with the neighbors, only with social interaction with family and friends.

Table 30: Meeting place characteristics; Accessibility, Location, Shape and Reconfigurable Independent samples t-

		Absence of loneliness		Social interaction Family & Friends		Social interaction Neighbors	
		t	Sig. (2-tailed)	t	Sig. (2-tailed)	t	Sig. (2-tailed)
		.909	.367	.797	.444	.112	.911
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Stairs	10	42.10	5.86	5.11	3.45	3.96	1.81
Lift and stairs	66	40.11	6.55	4.22	2.17	3.88	2.12
Location		t	Sig. (2-tailed)	t	Sig. (2-tailed)	t	Sig. (2-tailed)
		-.021	.983	.828	.410	.141	.888
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Ground floor	45	40.36	6.66	4.52	2.49	3.92	1.83
First floor	31	40.39	6.27	4.07	2.17	3.85	2.42
Shape		t	Sig. (2-tailed)	t	Sig. (2-tailed)	t	Sig. (2-tailed)
		-1.576	.119	-1.905	.061	.097	.923
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Rectangle	58	39.72	6.78	4.05	2.19	3.90	2.21
Square	18	42.44	4.89	5.25	2.72	3.85	1.60
Reconfigurable		t	Sig. (2-tailed)	t	Sig. (2-tailed)	t	Sig. (2-tailed)
		.909	.367	.797	.444	.112	.911
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
No	10	42.10	5.86	5.11	3.45	3.96	1.81
Yes	66	40.11	6.55	4.22	2.17	3.88	2.12

Table 31: Meeting place characteristics; Decoration independent samples t-test

		Absence of loneliness		Social interaction Family & Friends		Social interaction Neighbors	
		t	Sig. (2-tailed)	t	Sig. (2-tailed)	t	Sig. (2-tailed)
		1.163	.249	1.887	.085	-.237	.813
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Not present	8	42.88	3.68	5,42	1,61	3,72	1,39
Present	68	40.07	6.67	4,21	2,41	3,91	2,15
Plants		t	Sig. (2-tailed)	t	Sig. (2-tailed)	t	Sig. (2-tailed)
		.507	.614	-.233	.817	-1.154	.134
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Not present	20	41.00	4.68	4,23	2,40	3,17	2,61
Present	56	40.14	7.01	4,38	2,37	4,15	1,81
Bookshelves		t	Sig. (2-tailed)	t	Sig. (2-tailed)	t	Sig. (2-tailed)
		-.464	.644	.763	.448	1.766	.082
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Not present	36	40.00	7.22	4,56	2,55	4,33	1,92
Present	40	40.70	5.76	4,14	2,20	3,50	2,16

Two different types of **decoration** were included in the analysis. The presence of paintings did not show any significant relation with the feelings of loneliness and the social interaction with neighbors. Noticeable is that the presence of paintings is negatively related with the social interaction with family and friends with a significance of $p=.085$. The presence of plants was found to have no significant association with the dependent variables. The presence of (book)shelves did not have a significant association with the feelings of loneliness and the social interaction with family and friends. Noticeable is that the presence of (book)shelves was found to have a negative relation with the social interaction with neighbors, which cannot be explained.

The final characteristic that was taken into account was the **facilities** that were present in the meeting place. The analysis showed that there was no significant difference in dependent variables for the independent variables; pantry, toilet, entertainment, WIFI and air-conditioning. There was only one significant effect found, which is the presence of a kitchen in the meeting place. This was related to the social interaction of the respondent with family and friends. The absence of a kitchen in the meeting place has a negative influence on the social interaction between the respondent and their

Table 32: Meeting place characteristics; Facilities independent samples t-test

		Absence of loneliness		Social interaction Family & Friends		Social interaction Neighbors	
Kitchen		<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>
		-.945	.348	-1.948	.055	-.003	.998
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Not present	12	38.75	7.97	3,14	1,80	3,89	1,76
Present	64	40.67	6.16	4,56	2,40	3,89	2,14
Pantry		<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>	<i>T</i>	<i>Sig. (2-tailed)</i>
		.635	.527	-.061	.952	-.063	.950
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Not present	41	40.80	6.14	4,32	2,53	3,88	2,26
Present	35	39.86	6.86	4,36	2,18	3,91	1,86
Toilet		<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>	<i>T</i>	<i>Sig. (2-tailed)</i>
		-.825	.412	.775	.441	.264	.792
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Not present	15	39.13	7.14	4,76	2,37	4,02	2,23
Present	61	40.67	6.31	4,23	2,37	3,86	2,05
Entertainment		<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>	<i>T</i>	<i>Sig. (2-tailed)</i>
		-.505	.615	-1.265	.210	1.553	.125
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Not present	33	39.94	7.54	3,95	2,47	4,31	1,71
Present	43	40.70	5.57	4,64	2,26	3,57	2,29
WIFI		<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>
		-.606	.547	-1.090	.291	2.109	.380
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Not present	11	39.27	8.61	3,77	1,76	5,08	1,41
Present	65	40.55	6.09	4,43	2,45	3,69	2,11
Air conditioning		<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>	<i>t</i>	<i>Sig. (2-tailed)</i>
		.825	.412	-.775	.441	-.264	.792
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Not present	61	40.67	6.31	4,23	2,37	3,86	2,05
Present	15	39.13	7.14	4,76	2,37	4,02	2,23

family and friends. It is remarkable that there were no significant values found for the presence of the different types of facilities in relation with the feelings of loneliness and the social interaction with neighbors.

Social accessibility indicates whether the respondents found it difficult to join meetings or organized activities. Respondents might experience a barrier to participate in activities, because they would feel excluded or uncomfortable to join other older adults that are using the meeting place as well. Table 33 showed a slightly significant relation ($p=.080$) between the social accessibility experienced and social interaction with the neighbors. Noticeable is that respondents that indicated that they experienced the meeting place as socially accessible reported a higher social interaction with neighbors compared to respondents that reported the meeting place as socially inaccessible. This indicates that a positive social accessibility stimulates the social interactions with neighbors.

Table 33: Experiences of the meeting place independent samples t-test

Experiences of the meeting place according to the respondents							
		Absence of loneliness		Social interaction Family & Friends		Social interaction Neighbors	
<i>Social accessibility</i>		<i>t</i>	<i>Sig.</i>	<i>t</i>	<i>Sig.</i>	<i>t</i>	<i>Sig.</i>
		-1.341	.184	-1.361	.178	-1.775	.080
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Social inaccessible	27	39.04	6.92	3.84	3.33	3.33	2.17
Social accessible	49	41.10	6.14	4.61	4.20	4.20	1.97

During the interviews, location visits and data collection when conducting the survey some remarkable insights were gained that are not previously mentioned. These insights are derived from several conversations and small talks with residents of some complexes and from the conducted interviews. This subparagraph will take a closer look at these insights.

Social circle

Some residents indicated that only certain people make use of the meeting place and that they are not part of that “group”. This indicated that some residents experienced that only certain groups or social circles are making use of the room. When residents are not part of that social circle, they do not feel welcome and experience a social barrier to use the meeting place. This was surprising, since the interviews showed that everyone is always welcome to join activities or meetings. Based on the descriptive statistics it can be seen that certain residents and respondents do not feel included and need to be included before they are able to participate in activities. At least two locations experienced this phenomenon, where one of the respondents stated the following before partaking in the research:

“I am not part of that group that is making use of the meeting place, since I do not belong within their social circle”.

Changes in resident composition

Another difficulty that came to light is that in a normal situation a housing association does not match their residents. This system ensures that no one can be excluded, and everyone has the same chance of qualifying for the apartment. In multiple interviews this topic was addressed as one of the difficulties when bringing people together. When an active member moves out or passes away the housing association places a new tenant in the apartment as soon as possible. The residents’ committee experiences difficulties with new resident(s) that do not feel part of the group. This can be caused by multiple reasons, such as large age difference, not interested in the social activities, mentally/

physically unstable, language barrier or other reasons. According to the interviews and literature, meeting places should be a facility for social interaction between neighbors where activities and meeting are organized. Some residents' committees find it better to use a candidate list or nominate a new tenant as an alternative. This gives them a little more influence and they think they can find better connections to maintain meetings and social interactions with the entire complex. During the interviews it was found that this is only possible when the residents form an official residential group.

Official registration residents committee

During the interviews it was found that two locations did not have an official residents' committee. This was caused by the fact that many residents do not want to have the responsibility over a meeting place or over fellow residents. This could be a problem when implementing a new meeting place at a certain location. When none of the residents want to take responsibility it can be difficult to get these social interactions going and as a result the meeting place will end up being unused. This might be an important aspect for social housing associations to take into consideration.

Taking care of each other

The literature study described that the government chose for the strategy to let older adults age in their own home. This means that older adults are living independently for a longer period of time and will have to rely on family and friends. This was also supported by the collected data and statements of residents. Older adults that needed and got help from their neighbors with daily activities in order to live longer independently. From doing groceries to helping them get dressed, many older adults would not be able to live on their own without the help of their neighbors. This is where the increased social contacts with neighbors and a residents' committee have an impact as well. The interviewees indicated that without the meeting place the social connection with fellow residents would not have been that strong and only consisted of small talk.

The physical characteristics of the meeting place were taken into account, but the respondents also indicated some experiences of the meeting place. The data shows that the **importance of the meeting place for residents** indicates a significant relation ($p=.010$) with the social interaction with neighbors. The importance of the meeting place is positively associated with more social interactions with neighbors. There was no significant relation found between the feelings of loneliness and social interaction with family and friends. The **atmosphere of the meeting place** was found to have a significant relation ($p=.049$) with the social interaction with family and friends and a significant relation ($p=.025$) with social interaction with neighbors. Table 34 shows that the more pleasant the atmosphere was, the more social interaction with neighbors took place. However, this is not the case for the social interaction with family and friends, since the respondents who indicated that the atmosphere was unpleasant did report a higher social interaction score. This can possibly be explained by the small number of respondents from that category. The **satisfaction with the atmosphere** only showed a significant relation ($p=.047$) with the social interaction with neighbors, whereas respondents that are more satisfied with the atmosphere reported to have more social interactions compared to the categories.

Table 34: Experiences of the meeting place ANOVA

		Absence of loneliness		Social interaction Family & Friends		Social interaction Neighbors	
		F	Sig.	F	Sig.	F	Sig.
Importance to the residents		1.726	.185	.991	.376	4.875	.010
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Unimportant	14	43.21	4.19	4.66	2.22	3.51	2.23
Neutral	16	40.06	6.07	3.61	2.56	2.69	1.56
Important	46	39.61	7.00	4.49	2.33	4.42	2.02
Social accessibility		.934	.398	1.248	.293	3.137	.049
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Inaccessible	6	38.33	10.27	4.53	2.28	4.60	1.64
Neutral	21	39.24	5.97	3.65	2.19	2.97	2.20
Accessible	49	41.10	6.14	4.61	2.43	4.20	1.97
Atmosphere		.031	.970	3.151	.049	3.902	.025
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Unpleasant	6	41.00	7.24	5.29	2.15	2.99	1.68
Neutral	27	40.33	6.02	3.47	2.17	3.20	2.09
Pleasant	43	40.30	6.77	4.75	2.39	4.45	1.97
Satisfaction with the atmosphere		.013	.987	1.677	.194	3.185	.047
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Unsatisfied	8	40.25	6.73	5.31	1.96	3.76	1.24
Neutral	26	40.23	6.04	3.74	2.47	3.12	2.09
Satisfied	42	40.48	6.81	4.52	2.32	4.39	2.08

The experiences of the meeting places are compared to the six locations in Table 35. The results show that Location 3 has the highest averages for importance to the residents, atmosphere, satisfaction with the atmosphere and social accessibility of the meeting place. Noticeable is that the average social interaction score with neighbors is also the highest at Location 3. Nevertheless, the average social interaction score with family and friends, and the average score for absence of loneliness visible in Table 28 are the highest at Location 2.

Table 35: Experiences of the meeting place ANOVA

	Importance to the residents	Social accessibility	Atmosphere	Satisfaction with the atmosphere
Location 1	2.90	1.70	2.70	2.60
Location 2	2.38	1.50	2.13	1.88
Location 3	3.00	1.91	2.91	2.91
Location 4	2.00	1.75	2.33	2.50
Location 5	2.20	1.47	2.33	2.07
Location 6	2.30	1.60	2.50	2.60

The final bivariate analysis performed were derived from the interviews with member(s) of the residents' committees. Table 36 shows that the **responsible organizers of activities** within the meeting place does not have any significant association with the three dependent variables. During the interviews it was also discovered that the meeting places are not always **available at any time for the residents of the complex**. Meeting places that were not always accessible needed some sort of reservation or residents would need to ask the residents' committee for a key. The results show that the accessibility at any time is positively related with the social interaction with neighbors with a significance of $p=.080$. Accessibility does not have any relation with the other dependent variables.

The **frequency of the activities** was found to have no significant association with the three dependent variables, which indicates that the frequency the activities organized do not show a relation with the feelings of loneliness and the social interaction with family and friends, and neighbors.

Table 36: Social characteristics of the meeting place independent samples t-test

		Absence of loneliness		Social interaction Family & Friends		Social interaction Neighbors	
<i>Organizes activities</i>		t	Sig. (2-tailed)	t	Sig. (2-tailed)	t	Sig. (2-tailed)
		.243	.809	1.641	.105	1.630	.107
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Residents committee	32	40.52	6.78	4.71	2.41	4.22	1.83
Residents committee and initiatives from residents	42	40.16	6.10	3.82	2.23	3.44	2.32
<i>Availability of the meeting place</i>		t	Sig. (2-tailed)	t	Sig. (2-tailed)	t	Sig. (2-tailed)
		1.050	.300	-.011	.991	-1.777	.080
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Not available at any time	50	40.98	5.75	4.34	2.49	3.59	2.08
Available at any time	26	39.19	7.63	4.34	2.15	4.47	1.97

Table 37: Social characteristics of the meeting: frequency of the activities ANOVA

<i>Frequency of the activities</i>		F	Sig.	F	Sig.	F	Sig.
		1.067	.349	.996	.374	1.579	.213
	N	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Twice a week	42	40.62	6.03	4.13	2.58	3.56	2.20
Once a week	26	39.19	7.63	4.34	2.15	4.47	1.97
Once a month	8	42.88	3.68	5.42	1.61	3.72	1.39

5.4. Dependent variables

The three dependent variables will be checked for correlations in this paragraph. This was done with the Pearson Product-Moment correlation coefficient. Table 38 shows the significance between these variables and the strength and direction of the correlation (r).

Table 38 shows that not all the dependent variables are correlated with each other. The feelings of loneliness is positively correlated ($r=.503$) with social interaction with family and friends. The correlation can be identified as positively “strong” and indicates that respondents who perceived higher social interaction scores for family and friends are likely to have less feelings of loneliness and therefore a higher loneliness score. Surprisingly, the feelings of loneliness is not significantly related with the social interaction with neighbors. On the contrary, the social interactions with family and friends are positively correlated ($r=.339$) with the social interaction with neighbors and can be identified as a positive “medium” correlation, indicating that respondents with a perceived higher social interaction score with neighbors experienced a higher level of social interaction with family and friends.

Table 38: Dependent variables Pearson’s Rho correlation

		Absence of loneliness		Social interaction Family & Friends		Social interaction Neighbors	
<i>Pearson’s Rho correlation</i>		r	Sig. (2-tailed)	r	Sig. (2-tailed)	r	Sig. (2-tailed)
Loneliness				.503	.000	.127	.275
Social interaction Family & Friends		.503	.000			.339	.003
Social interaction Neighbors		.0127	.275	.339	.003		

5.5. Conclusion

The results of the bivariate analyses are shown in Table 39. This table shows the discovered relations, positive (+) and negative (-), between the dependent and independent variables. The dark green values indicate a p-value of .05 and the light green a p-value of .10.

The results demonstrated that the personal characteristics showed many associations with the three dependent variables. The only personal characteristic that was not found to have any significant relation with the dependent variable was the migration background. The socio-environmental characteristics were found to have multiple significant relations with the dependent variables as well. The focus for this research is based on the physical characteristics of the meeting place that could have an influence on the social interaction and the feelings of loneliness. Striking is that none of the physical characteristics independent variables showed any significant relation with the feelings of loneliness. From these results it can be concluded that the physical characteristics do not seem to have an influence on the feelings of loneliness.

However, several significant relationships were found between the physical environmental characteristics and the social interaction with family and friends. However, some of them could not be (fully) explained or showed only a slightly significant relation. The variables that did show a positive explainable relationship with the interaction with family and friends are the size of the meeting place, a larger place supports social interaction more compared to a smaller place, and the atmosphere.

There were also several significant relationships found between the physical environmental characteristics and the social interaction with neighbors. Noticeable is that this is especially the case for the perceived meeting place experiences by the respondents. The importance of the meeting place, the social accessibility, a pleasant atmosphere and satisfaction with the atmosphere all showed a positive significant relationship with the social interaction with neighbors.

The analysis showed that neighborhood social interaction was influenced by the importance of the meeting place for the residents, the social accessibility, the atmosphere and whether the meeting place is open for residents whenever they would like to use it. The insights from the interviews and through the data analysis gave a better understanding of the social influences behind the meeting place.

Furthermore, it can be concluded that the residents' committees all agreed that organizing and promoting a variety of activities improves the attendance and the usage of the meeting place within the apartment complex. Without an organization that keeps the residents in close contact with each other, the meeting place will most likely barely be used or in the worst case not used at all. The goal is identical for each meeting place; to strengthen social interactions between neighbors and provide a place to meet and participate in activities with fellow residents.

Based on the data descriptions, the results and findings it can be concluded that there does not seem to be one 'perfect' implementation of a meeting place, caused by the fact that every individual and group of people is different. This indicates that every implementation of a meeting place within an apartment complex requires a case-based plan where the organization and social interaction between neighbors should have the priority. In the next chapter the results of this research will be discussed and interpreted in light of existing studies and literature.

Table 39: Overview of the bivariate analysis

Personal characteristics	Absence of loneliness	Social interaction family & friends	Social interaction neighbors
- Age			+
- Gender (male)	+		
- Migration background			
- Education level	+		+
- Income	+	+	
- Physical health	+		
- Mental health	+	+	
- Volunteer work	+	+	+
- Household composition (partner)	+	+	+
Socio-environmental characteristics			
- Partner status	+	+	+
- (grand)Children		+	
- Building social cohesion			+
Physical environmental characteristics			
Environment			
- Presence of green			
- Presence of facilities			
- Presence of transportation			
Building			
- Number of floors			+
- Number of apartments			
- Common spaces:			
▪ Balcony present		-	
▪ Bicycle parking present		-	
Meeting place			
- Visibility			
- Accessibility			
- Size		+	
- Shape (rectangle)		-	
- Reconfigurable			
- Decoration present:			
▪ Paintings		-	
▪ Plants			
▪ Bookshelves			-
- Facilities present:			
▪ Kitchen		+	
▪ Pantry			
▪ Toilet			
▪ Entertainment			
▪ WIFI			
▪ Airconditioning			
- Meeting place experiences:			
▪ Importance to the residents			+
▪ Social accessibility			+
▪ Atmosphere		+	+
▪ Satisfaction with the atmosphere			+

- Residents' committee			
▪ Organizes activities			
▪ Availability (any time)			+
▪ Frequency of activities			

6. Discussion

In this chapter the results will be interpreted according to existing literature. Paragraph 6.1. describes the interpretation of the results from this study with existing literature. Paragraph 6.2. describes the limitations that could have limited the results of this study.

6.1. Interpretations

The most significant associations were found within the personal characteristics of the respondents in relation to feelings of loneliness, social interactions with family and friends and the social interaction with neighbors. The results show that age is only significantly related with the social interaction with neighbors, where the older the respondents are, the less social interaction with neighbors takes place. This is in line with the literature, where studies indicate that the older people get, the less social interactions take place (Coumans, 2010).

Although this research did not find a significant relationship between loneliness and age, other studies indicated that the feelings of loneliness increases when adults become older (de Jong-Gierveld & van Tilburg, 2006; Hawkey et al., 2008). Furthermore, the results indicated that male respondents scored higher on the loneliness scale, which indicates that they feel less lonely compared to women. This result corresponds with other studies as well (Pinquart & Sörensen, 2001a; Chodorow, 1978). There was no relation found between gender and both social interaction forms, although previous studies reported that women have more social interactions compared to men (Coumans, 2010).

Moreover, there was no significant relation found between the migration background and the dependent variables. This indicates that migration background does not have an influence on the feelings of loneliness or the social interaction score. In contrast, the study of Wu & Penning (2015) discovered that middle-old groups were found to have an influence on the feelings of loneliness. It is positive to see that older adults with a migration background do not feel more lonely or have fewer social interactions compared to older adults without a migration background. In addition, the results of this research show that the level of education is significantly related to the feelings of loneliness and the social interaction with neighbors, where a higher level of education indicates that respondents did feel less lonely compared to respondents with a lower education level. This result is in line with previous studies (Pinquart & Sörensen, 2001; Savikko et al., 2005). The same effect was found for the social interaction with neighbors. Noticeable is that this effect was not found with the social interaction with family and friends, while other studies did report this effect (Coumans, 2010).

The level of income showed a significant relation with the feelings of loneliness and social interaction with family and friends. In both cases a higher the level of income would result in less reported feelings of loneliness and higher social interactions with family and friends. These results are in line with the study from Savikko et al. (2005). This association is explicable, since older adults with higher levels of income are able to participate in every type of activities or excursions without having to worry about finances. Therefore, it might be easier for them to interact with family and friends.

The self-determined physical health of respondents showed a significant relation with feelings of loneliness. Respondents with a higher self-determined physical health score showed a higher loneliness score and therefore less feelings of loneliness compared to the self-determined lower physical health scores. This result is in line with multiple studies (Savikko et al., 2005; Victor et al., 2015). A possible explanation for the association between physical health and loneliness is that older adults with better physical health experience fewer physical problems with meeting people or going to and accessing places compared to older adults with a decreased physical health. Therefore, poor physical health could prevent older adults from meeting others, resulting in more feelings of loneliness.

The mental health scores showed the same significant relation with the feelings of loneliness and a slightly significant relation with the social interaction with family and friends. A higher self-determined mental health indicated a higher social interaction score with family and friends. This can also be explained by the fact that older adults with a good mental health would be more likely to maintain their social contacts and relations compared to older adults with a decreased mental health.

Volunteer work was the only variable that was significantly related to all three independent variables. Respondents that reported that they participate in volunteer work scored higher loneliness and social interaction scores compared to respondents that did not work as volunteer, which means that older adults who work as a volunteer feel less lonely and are more socially interaction with their family and friends, and neighbors. The literature research stated that volunteer work could alleviate loneliness among widowed older adults (Carr et al., 2018), but this research indicates that volunteer work is also positively related to the absence of loneliness and social interaction scores in the general sample of older adults. Volunteer work keeps older adults socially active and involved in the community, which could explain the increased loneliness score (more absence of loneliness) and social interaction scores.

Partner status was found to be significantly related to the feelings of loneliness and both social interaction scores. This is understandable, since a partner will guarantee at least one close connection compared to older adults who have no partner (anymore). This result was also found in multiple other studies (Wenger et al., 1996; de Jong-Gierveld & van Tilburg, 2010). Having a partner is furthermore slightly significantly related to the social interaction with neighbors. This could be caused by the idea that people find it more difficult to socially interact alone with neighbors compared to interacting with neighbors together with a partner. Having (grand)children was not found to be significantly related to the feelings of loneliness and the social interaction with neighbors. However, it does have a significant relation with the social interaction between family and friends. This is unsurprising, since having (grand)children likely ensures some social interaction with family. Literature shows that visits from children could decrease depressive symptoms (Buber & Engelhardt, 2008). That could not be proven for the feelings of loneliness in this study.

The results of this research did not show a significant relation between building social cohesion and the feelings of loneliness and the social interaction with family and friends, indicating that a higher building social cohesion does not directly influence the feelings of loneliness in individuals, according to the results. Contrary to this research, literature showed that a good neighborhood social cohesion is associated with lower social and overall feelings of loneliness. This study only included the building social cohesion, instead of neighborhood social cohesion. This could therefore be a reason for the difference between this study and the literature. Although building social cohesion did not seem to have a positive effect on the feelings of loneliness and social interaction with family and friends, it was found that building social cohesion is positively significantly related with the social interaction between neighbors. This indicates that a better building social cohesion leads to an increased social interaction between neighbors.

For the neighborhood characteristics that were included within the dataset there were no significant relations found with the feeling of loneliness, social interaction family and friends, and neighbors. This is in contrast with existing literature, which indicated that the presence of green does have an influence on the feelings of loneliness and the perceived social support (Maas et al., 2009). A possible explanation for this inconsistency is that the dataset consisted of respondents that are all living in an urban area. Also, the different types of green were not taken into account. However, there is also research that showed that natural environments were not associated with loneliness. (Zijlema et al., 2017). The results of this study are in line with that research.

As mentioned before, the presence of facilities was not significantly related with the three dependent variables. This is different from previous studies, since they have shown that presence of facilities could have a positive influence on the feelings of loneliness (Domènech-Abella et al., 2020). Moreover, the different use of transportation methods did not show to have a significant relation with the feelings of loneliness or both social interaction scores. The only transportation method that could be taken into account was the tram, since there were no other differences in transportation methods found between the locations. This might explain why other studies did find the use of different transportation methods was significantly related to lower levels of loneliness and this research did not. (Weijs-Perrée et al., 2015; van den Berg et al., 2016a).

The literature research indicated several building characteristics that have an association with the feelings of loneliness or social interaction in previous studies. In line with previous studies, this research showed that the size of the community or the number of apartments did not show a significant relation with the three dependent variables in this study. This indicates that the feelings of loneliness or social interaction scores are not significantly related to the number of apartments in the building, while previous studies indicated that larger communities have fewer social interactions (Smith, 1986; Fromm, 1991). On the other hand, very small communities have a lack of privacy, which could result in withdrawal from social interactions (Williams, 2006). The dataset showed community size ranged from 54 to 119. This might be middle-sized, where neither negative effects take place. Low- or medium-rise was taken into account with the number of floors. There was no significant relation found between the number of floors and the feelings of loneliness and social interaction with family and friends. However, there was a slightly significant effect with the social interactions with neighbors, this might indicate that higher floor levels have more social interaction with neighbors. This is in contrast to the findings of Abu-Ghazze (1999), who found that residents in higher floors find it too much effort or cannot be bothered to join the public areas. A possible explanation for this difference is that the study of Abu-Ghazze was conducted with high-rise buildings, while this study only included low-/medium rise.

The common spaces that were taken into account were the shared balcony and bicycle parking. Both showed a slightly significant relation with the social interaction between family and friends. Previous studies found that the presence of common spaces could result in a decreased chance that residents feel socially alienated and an increased chance for social interactions (Ferguson & Ferguson, 2016). It would make sense that neighborhood social interactions could increase when people have social interactions within these common spaces, but the results of this study showed a decrease of social interaction with family and friends when there is a common balcony and bicycle parking. A possible explanation or other interpretation could not be given.

As stated, there were no physical characteristics of the meeting place that had a significant relation with the feelings of loneliness. The visibility, accessibility, location, reconfigurability, presence of plants, pantry, toilet, entertainment, Wi-Fi and air conditioning all did not show a strong significant relation with any dependent variable. The results that could be interpreted were the presence of facilities and the perceived characteristics of the meeting place. Based on the results it can be concluded that location 3 has the least facilities available, but shows the highest average social interaction scores and the highest average perceived experience scores. This indicates that the facilities of the meeting places have no effect on social interactions between neighbors and the perceived experiences of the meeting place. The best perceived meeting place according to the residents of that location seem to have the highest average social interaction score between neighbors. This indicates that a higher perceived experience of the meeting place stimulates the social interactions between neighbors. Furthermore it can be stated that the meeting place at Location 3 is

best perceived by its residents, which results in a higher social interaction with neighbors. However, a higher interaction with neighbors does not necessarily contribute to an overall absence of loneliness for residents or a higher social interaction with family and friends.

In line with these findings is that the experiences of the residents about the meeting place do have an influence on the social interactions between neighbors. The results show that the importance of the meeting place was significantly related with the social interaction between neighbors, indicating a greater perceived importance of the meeting place is positively related with an increased score of social interactions with neighbors. A social barrier might be experienced when entering or joining the activities within the meeting place. The social accessibility was significantly related with the social interaction with neighbors. This indicates that people who experienced no social inaccessibility reported a higher social interaction score with their neighbors. The perceived atmosphere of the meeting place was significantly related with both social interaction scores. A pleasant atmosphere leads to more social interactions with neighbors, as well as family and friends. Surprisingly, it has to be stated that people who found the atmosphere unpleasant reported relatively high social interaction scores with family and friends. This might be explained by the fact that only six respondents indicated that they found the atmosphere unpleasant, which is a relatively small group in the dataset.

Expectations for this research were to find physical characteristics of the meeting place that influenced the feelings of loneliness and social interactions. The results showed that there were not many significant relations between the characteristics and the dependent variables and that some (slightly) significant relations could not be explained. Therefore, this research showed that the physical characteristics of the meeting place do not have an influence on the feelings of loneliness or social interactions. The personal experience and the feelings of the respondents regarding the meeting place are much more important than the physical characteristics of the meeting place. Additionally, the organization behind the meeting place, such as a residents' committee, was found to be much more important, since they provide a foundation for residents to meet and socially interact with each other.

6.2. Limitations

This study aimed to look into the characteristics that might have an influence on the feelings of loneliness and the social interactions of older adults that are living independently in social apartment complexes. This approach limits this research to apartment complexes only and is therefore only applicable to this dwelling type. This is also the case for the target group of older adults that are 65 years and older.

The dataset was compiled using data from locations throughout the city of Amsterdam and one location in Diemen. Another limitation from this research is that the results that are formulated and reported are not generalizable for all larger cities in the Netherlands or other countries. The dataset can only be compared with other national or international studies if the same target group, residential dwelling type and urban density is defined as in this research.

The number of respondents from the dataset is relatively low compared to other studies. This might be caused by the fact that the data was collected during the summer holidays end July, August and early September in the Netherlands. Multiple approaches were adopted to reach respondents and different methods were integrated to gather as many results as possible. Unfortunately, the number of respondents who participated in the survey remained low.

Another limitation of this research is that only the frequency and number of social interactions is measured. These numbers do not say anything about the quality of the social interactions. There can

be a large difference between the quality of the social interaction and the amount of time the social interaction lasted. This could be an important insight that is not taken into account within this study but could be interesting for further research.

During the data collection it was noticed that some initial responses to the survey were that the individuals did not make use of the meeting room and thought his response would not be interested in this research. Although this was clearly mentioned on the front page of the survey, it is possible that many potential respondents thought they would not need to fill in the survey. Luckily, there were still several respondents that indicated they rarely to never make use of the meeting place. Therefore, it can be stated that this group is included within the research.

The final limitation is that during the interviews it was stated that some activities were suspended during the COVID-19 pandemic. As a result, people who had just moved in rarely experienced meetings or activities within the meeting place. Although the pandemic was over during the data collection and there were no more restrictions it could be the case that residents were still holding back on social interactions or personal contact. This could have had an influence on the social interactions scores in this research.

Despite its limitations, this research has shown that the physical characteristics of the meeting place do not seem to affect the feeling of loneliness and social interaction scores. Furthermore, this research has shown the importance of the organization behind the meeting place in order to enable the residents to socially interact with their neighbors.

Further research should look into the perceived characteristics of the meeting place that is experienced by the residents of the apartment complex. The results have shown that the importance, atmosphere and social accessibility of the meeting place is related with the social interactions between neighbors. There could be more perceived characteristics that could stimulate the social interactions and decrease the feelings of loneliness.

7. Conclusion

The population of older adults is growing in the Netherlands and many of them prefer to age in place. The government of the Netherlands stimulates aging people to live independently as long as possible for multiple reasons. One of them is that there are and will not be enough nursing homes for this growing population of older adults. While there are many positive effects of this approach, one serious problem can occur which is described as the “silent killer” (Pennycook, 2016), also known as loneliness. With the strategy “Langer thuis” (Rijksoverheid, 2020b) the government of the Netherlands focusses on enabling older adults to live longer independently. One of the stimulated solutions in this program is to create a place where residents (of social housing apartments) can meet each other and be socially connected with their neighbors.

It is currently unknown if there are certain characteristics of the meeting place that could have positive influence on the social interactions and reduce feelings of loneliness among the residents. This study aimed to get more insight in the physical characteristics of a meeting place that might have an influence on the feelings of loneliness and the social interactions of older adults that are living independently in social apartment complexes. The main research question was formulated as following.

Which (physical) characteristics of meeting places stimulate the social interaction and reduce the feelings of loneliness among older adults living independently in social apartment complexes?

The goal for this research was to get more insights in the (physical) characteristics of meeting places that could have an influence on the social interactions and feelings of loneliness among older adults that were living independently. In order to do so, literature research was conducted to identify the variables that could have an influence on the dependent variables ‘social interactions’ and ‘feelings of loneliness’. Based on the identified variables in the literature research a conceptual model was developed. To test this conceptual model data needed to be collected. The data collection consisted of three parts. The first phase was a survey for residents which gave insights in their demographic information, social interactions, feelings of loneliness and experiences with the meeting place. The second phase was a checklist that provided the physical information about the neighborhood, building and meeting place and interviews that gathered background information about the organization behind the meeting place. The data of seventy-six respondents and six different locations were examined through statistical analysis.

The statistical analyses that were performed to analyze the data were independent samples t-tests, ANOVA and Pearson’s product-moment correlations. From the statistical analyses it can be concluded that physical characteristics of the meeting place do not have an effect on the feelings of loneliness among the older adults. The social interaction with family and friends is positively related with a larger size of the meeting place and a better experienced atmosphere. The social interaction with neighbors was found to be positively related with the importance of the meeting place, social accessibility, pleasant atmosphere and satisfaction with the atmosphere.

Based on the results of this study it can be concluded that the physical characteristics of the meeting place seem to have little to no influence on the feeling of loneliness and social interactions of the residents in social apartment complexes. The perceived experiences of the meeting place however seem to have much more effect, especially on the social interactions with neighbors. A meeting place that is embraced by the residents can potentially increase the social interactions and decrease the feelings of loneliness.

To enable the residents to make optimal use of the meeting place a strong organization that organizes weekly to monthly activities for everyone and stimulates residents to join, participate and contribute to the social interaction with fellow residents will be more likely to achieve the common goal. It is advised to strengthen the social interaction between neighbors and provide a place to meet and participate in activities with fellow residents.

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Appendix A: Survey (Dutch)

Ontmoetingsplekken om sociale interactie te verhogen en het gevoel van eenzaamheid te verlagen

Dit onderzoek is ontwikkeld aan de Technische Universiteit Eindhoven en is onderdeel van het afstudeerproject van onderzoeker Maxime Langeslag. Het doel van dit onderzoek is om beter inzicht te krijgen in hoe bepaalde fysieke kenmerken van de ontmoetingsplek sociale interacties kunnen stimuleren en het gevoel van eenzaamheid kunnen verminderen onder ouderen die zelfstandig wonen in sociale appartementen. Wij zouden het zeer op prijs stellen als u ongeveer 10 minuten van uw tijd zou willen nemen om de enquête in te vullen. Om deel te nemen aan dit onderzoek en deze enquête is uw toestemming nodig. Voordat u beslist of u wilt deelnemen, krijgt u een uitleg over de inhoud van het onderzoek op het informatieblad onderaan deze pagina, voor meer details over het onderzoek en de gegevensverzameling. Lees deze informatie zorgvuldig door en stel uw vragen aan de onderzoeker als u vragen heeft. Er zijn 21 vragen/opgaven in deze enquête.

Enquête – Informatie blad

De enquête is ontwikkeld door een student/onderzoeker van de faculteit Built Environment van de Technische Universiteit Eindhoven en maakt deel uit van het onderzoek "Kenmerken van de ontmoetingsplek die de sociale interactie stimuleren en het gevoel van eenzaamheid verminderen bij ouderen die zelfstandig wonen in sociale appartementen". Het doel is om meer inzicht te krijgen in de kenmerken van de ontmoetingsplek die de sociale interactie stimuleren en het gevoel van eenzaamheid verminderen. Uw antwoorden op de enquête helpen ons informatie te verzamelen over de ontmoetingsplaats en hoe deze de sociale interacties en de perceptie van eenzaamheid beïnvloedt bij zelfstandig wonende ouderen in sociale appartementen.

Wie mag deelnemen?

De doelgroep van deze enquête bestaat uit oudere volwassenen die zelfstandig wonen in sociale appartementen. U maakt deel uit van deze doelgroep en daarom vragen wij u deel te nemen aan de enquête.

Hoe lang duurt het invullen?

Het invullen van de enquête duurt ongeveer 10 minuten.

Ben ik verplicht deel te nemen?

Nee, deelname is geheel vrijwillig. Als u wel deelneemt, wordt u aan het begin van het onderzoek gevraagd uw toestemming te geven.

Welke gegevens worden in de enquête verzameld?

In de enquête krijgt u verschillende keuzes voorgelegd betreffende demografische vragen, aantal sociale interacties, plaatsen van sociale interacties en vragen om het gevoel van eenzaamheid te bepalen. Er zijn geen goede of foute antwoorden op deze vragen. U kunt de enquête op elk gewenst moment stopzetten.

Wat gebeurt er met de gegevens?

In het kader van het onderzoek worden verschillende persoonsgegevens verzameld en verwerkt, bijvoorbeeld over uw sociaaleconomische achtergrond (salarisgroep, leeftijd, geslacht, enz.). Het verzamelen, verwerken en analyseren van uw antwoorden en het opslaan van de gegevens is nodig om de wetenschappelijke vragen te kunnen beantwoorden die in dit onderzoek worden onderzocht

en om de resultaten te kunnen publiceren. Wij vragen uw toestemming om uw gegevens voor deze doeleinden te verwerken en op te slaan. Alle gegevens worden opgeslagen op servers van de Technische Universiteit Eindhoven. Voor de opslag van persoonsgegevens worden aanvullende maatregelen genomen die hieronder worden beschreven:

Vertrouwelijkheid van uw gegevens

Wij zullen alles in het werk stellen om uw privacy zo goed mogelijk te beschermen. Om uw privacy te beschermen, worden uw gegevens gepseudonimiseerd met een encryptiesleutel en door elke deelnemer een code van cijfers en tekens toe te kennen. Op deze manier wordt de informatie die u zou kunnen identificeren verwijderd uit de dataset die voor het onderzoek zal worden gebruikt. De gegevens kunnen alleen tot u worden herleid aan de hand van de encryptiesleutel. Deze sleutel wordt veilig bewaard door de lokale onderzoeksafdeling en deze sleutel is strikt gescheiden van de onderzoeksgegevens die voor de analyse worden gebruikt. De encryptiesleutel is uitsluitend beschikbaar voor de onderzoeker Maxime Langeslag en zijn directe supervisors: Pauline van den Berg en Oana Druta. Bovendien zal de encryptiesleutel aan het einde van het onderzoek worden vernietigd, waardoor heridentificatie van persoonsgegevens door gebruik van de sleutel onmogelijk wordt. De gegevens uit de enquête zullen ook worden samengevoegd in groeps categorieën, waardoor het herleiden van gegevens uit de enquête naar specifieke individuen vrijwel onmogelijk wordt. De combinatie van deze maatregelen zorgt ervoor dat onderzoeksgegevens niet tot u herleidbaar zijn in wetenschappelijke rapporten en publicaties over het onderzoek, en dat de gegevens die in dit onderzoek worden gebruikt uitsluitend in geanonimiseerde vorm beschikbaar zijn. De exclusieve gegevens zullen ook worden samengevoegd tot groepsniveau, geanalyseerd en gepubliceerd voor wetenschappelijke doeleinden, zoals wetenschappelijke artikelen en rapporten. Er zullen geen individuele antwoorden in de enquête openbaar worden gemaakt. De gegevens zullen uitsluitend voor wetenschappelijke doeleinden worden gebruikt. Omdat de verzamelde gegevens worden samengevoegd tot groepsniveau, kunnen ze niet tot u worden herleid in rapporten en publicaties over het onderzoek. Alle informatie zal vertrouwelijk worden behandeld in overeenstemming met de vereisten van de GDPR, zie hieronder voor details. Het privacy beleid van de TU/e is te vinden op: <https://www.tue.nl/storage/privacy/>.

Verantwoordelijke in de zin van GDPR

TU/e is verantwoordelijk voor het verwerken van uw persoonlijk data in het kader van dit onderzoek.

De contactgegevens van de TU/e zijn:

Technische Universiteit Eindhoven

De Groene Loper 3

5612 AE Eindhoven

Intrekken van uw toestemming en contactgegevens

Deelname aan dit onderzoeksproject is geheel vrijwillig. U kunt uw deelname aan het onderzoek op elk moment beëindigen of uw toestemming voor het gebruik van uw gegevens voor het onderzoek intrekken, zonder opgaaf van reden. Het beëindigen van uw deelname zal geen nadelige gevolgen voor u hebben. Indien u tijdens het onderzoek besluit uw deelname te beëindigen, zullen de gegevens die u tot het moment van intrekking van uw toestemming reeds had verstrekt, voor het onderzoek worden gebruikt. Indien u specifieke vragen heeft over de omgang met persoonsgegevens kunt u deze richten aan de functionaris gegevensbescherming van de TU/e door een mail te sturen naar functionarisgegevensbescherming@tue.nl. Daarnaast heeft u het recht om een klacht in te dienen bij de Nederlandse autoriteit voor gegevensbescherming: de Autoriteit Persoonsgegevens. Tot slot heeft

u het recht om te verzoeken om inzage, rectificatie, verwijdering of aanpassing van uw gegevens. Dien uw verzoek in via privacy@tue.nl.

Toestemming en geïnformeerde toestemming

Alvorens deel te nemen aan wetenschappelijk onderzoek is het belangrijk dat deelnemers weten dat deelname geheel vrijwillig is en dat wij uw toestemming nodig hebben om u deel te laten nemen aan het onderzoek en om de gegevens te verwerken die u ons geeft door de enquête in te vullen. Lees de onderstaande verklaringen zorgvuldig door. Als u het eens bent met deze verklaringen, kunt u uw toestemming geven aan het einde van deze pagina. Indien u niet akkoord gaat, kunt u de enquête sluiten. Door deel te nemen aan dit onderzoek, ga ik akkoord met het volgende:

- Ik heb de informatie over dit onderzoek gelezen en begrepen. Ik heb, indien nodig, de gelegenheid gehad om vragen te stellen aan de onderzoekers die dit onderzoek uitvoeren. Ik begrijp dat ik vrij ben om in de toekomst contact op te nemen met de onderzoeker met vragen over het onderzoek.
- Ik neem vrijwillig deel aan dit onderzoek en begrijp dat ik op elk moment kan weigeren te antwoorden of het onderzoek kan stopzetten, zonder dat ik daarvoor een reden moet opgeven.
- Ik geef toestemming voor het verwerken van mijn persoonlijke gegevens (inclusief enkele algemene vragen over mijn gezondheid) die tijdens het onderzoek verzameld worden op de manier zoals beschreven in het informatieblad.
- Ik ga akkoord met het gebruik en de opslag van de informatie die ik in deze enquête geef voor het doel van het onderzoek "Kenmerken van de ontmoetingsplaats die de sociale interactie stimuleren en het gevoel van eenzaamheid verminderen bij ouderen die zelfstandig wonen in sociale appartementen".
- Ik begrijp dat alle persoonlijke informatie vertrouwelijk wordt behandeld en niet aan derden zal worden doorgegeven.
- Ik begrijp dat de door mij verstrekte informatie niet tot mij herleidbaar is via rapporten en wetenschappelijke publicaties over dit onderzoek.
- Ik geef toestemming voor het opslaan van geanonimiseerde informatie uit het onderzoek in data-archieven, zodat deze gebruikt kan worden voor toekomstig onderzoek op het gebied van stadsplanning.
- Ik heb de verklaringen op deze pagina gelezen en begrepen en ik ga akkoord met al deze verklaringen.

Ik accepteer de voorwaarden

Algemeen:

Hieronder krijgt u een aantal vragen gesteld die meer inzicht geven in uw demografische eigenschappen.

Wat is uw geboorte jaar?	<input type="text"/>
Met welk geslacht identificeert u zich het meeste?	<input type="checkbox"/> Vrouw <input type="checkbox"/> Man <input type="checkbox"/> Anders
Heeft u of uw familie een migratie achtergrond?	<input type="checkbox"/> Ja <input type="checkbox"/> Nee <input type="checkbox"/> Geef ik liever geen antwoord op
Wat is uw hoogst afgeronde opleidingsniveau?	<input type="checkbox"/> Basis school <input type="checkbox"/> MAVO, VMBO of lager beroeps onderwijs <input type="checkbox"/> Middelbaar Beroeps Onderwijs (MBO) <input type="checkbox"/> HAVO/VWO <input type="checkbox"/> Hoger Beroeps Onderwijs (HBO) <input type="checkbox"/> Universiteit bachelor/ master <input type="checkbox"/> Anders
Wat is uw netto huishouden inkomen? (inclusief salaris, pensioen en andere vormen van inkomsten)	<input type="checkbox"/> Lager dan 1.000 <input type="checkbox"/> 1.001 – 2.000 <input type="checkbox"/> 2.001 – 3.000 <input type="checkbox"/> 3.001 – 4.000 <input type="checkbox"/> Hoger dan 4.000 <input type="checkbox"/> Weet ik niet/ deel ik liever niet
Hoe zou u uw fysieke gezondheid in het algemeen omschrijven?	<input type="checkbox"/> Uitstekend <input type="checkbox"/> Heel goed <input type="checkbox"/> Goed <input type="checkbox"/> Redelijk <input type="checkbox"/> Slecht
Hoe zou u uw mentale gezondheid in het algemeen omschrijven?	<input type="checkbox"/> Uitstekend <input type="checkbox"/> Heel goed <input type="checkbox"/> Goed <input type="checkbox"/> Redelijk <input type="checkbox"/> Slecht
Doet u vrijwilligerswerk of ander maatschappelijk werk?	<input type="checkbox"/> Ja <input type="checkbox"/> Nee
Wat is de samenstelling van uw huishouden?	<input type="checkbox"/> Zelfstandig <input type="checkbox"/> Met partner <input type="checkbox"/> Met partner en kind(eren) <input type="checkbox"/> Met andere familieleden <input type="checkbox"/> Met vrienden/ anderen

Ontmoetingsruimte in het wooncomplex

De volgende vragen gaan over de gerealiseerde ontmoetingsruimte in uw wooncomplex.

Hoe ervaart u de sociale toegankelijkheid van de ontmoetingsruimte in uw wooncomplex?	<input type="checkbox"/> Zeer toegankelijk <input type="checkbox"/> Toegankelijk <input type="checkbox"/> Neutraal <input type="checkbox"/> Ontoegankelijk <input type="checkbox"/> Zeer ontoegankelijk
Hoe belangrijk is de ontmoetingsplek voor het sociale contact met uw medebewoners van het wooncomplex?	<input type="checkbox"/> Zeer belangrijk <input type="checkbox"/> Belangrijk <input type="checkbox"/> Neutraal <input type="checkbox"/> Onbelangrijk <input type="checkbox"/> Zeer onbelangrijk
Hoe ervaart u de sfeer van de ontmoetingsruimte in uw wooncomplex?	<input type="checkbox"/> Zeer prettig <input type="checkbox"/> Prettig <input type="checkbox"/> Neutraal <input type="checkbox"/> Onprettig <input type="checkbox"/> Zeer onprettig
Hoe tevreden bent u over de sfeer van de ontmoetingsruimte?	<input type="checkbox"/> Zeer tevreden <input type="checkbox"/> Tevreden <input type="checkbox"/> Neutraal <input type="checkbox"/> Ontevreden <input type="checkbox"/> Zeer ontevreden

	Dagelijks	2 – 3 keer per week	Eén keer per week	2 – 3 keer per maand	Eén keer per maand	Enkele keren per half jaar	Enkele keren per jaar	Zelden tot nooit
Hoe vaak maakt u gebruik van de ontmoetingsruimte?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Sociale interactie

In dit onderdeel worden vragen gesteld over de sociale interactie met vrienden, familie, medebewoners en buurtbewoners.

Deze sectie geeft informatie over de sociale interactie van de respondent

Hoe tevreden bent u over uw sociale contacten met de mensen in uw gebouw?

- Zeer tevreden
 Tevreden
 Neutraal
 Ontevreden
 Zeer ontevreden

	Dagelijks	2 – 3 keer per week	Eén keer per week	2 – 3 keer per maand	Eén keer per maand	Enkele keren per half jaar	Enkele keren per jaar	Zelden tot nooit	Niet van toepassing
Hoe vaak heeft u persoonlijk contact met de volgende personen:									
Partner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Kinderen/ kleinkinderen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Andere familieleden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vrienden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mede bewoners van het gebouw	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Andere mensen uit de buurt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Deze sectie geeft informatie over de plaats van sociale interactie van de respondent

	Dagelijks	2 – 3 keer per week	Eén keer per week	2 – 3 keer per maand	Eén keer per maand	Enkele keren per half jaar	Enkele keren per jaar	Zelden tot nooit	Niet van toepassing
Hoe vaak groet en/of spreekt u met uw medebewoners op elk van deze plaatsen:									
Entrée hal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gang	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tuin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Balkon	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Parkeergarage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ontmoetings- ruimte	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wasruimte	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Opslag ruimte	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hoe vaak ontvangt u mensen uit uw gebouw bij u thuis?									
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hoe vaak bezoekt u mensen in uw gebouw bij hen thuis?									
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Uw beleving

Hieronder volgen elf stellingen. Geef aan in hoeverre deze op u van toepassing zijn.

Deze sectie geeft informatie over het gevoel van eenzaamheid van de respondent	Nee!	Nee	Min of meer	Ja	Ja!
Er is altijd wel iemand in mijn omgeving bij wie ik met mijn dagelijkse problemen terecht kan					
Ik mis een echte goede vriend of vriendin					
Ik ervaar een leegte om me heen					
Er zijn genoeg mensen op wie ik in geval van narigheid kan terugvallen					
Ik mis gezelligheid om me heen					
Ik vind mijn kring van kennissen te beperkt					
Ik heb veel mensen op wie ik volledig kan vertrouwen					
Er zijn voldoende mensen met wie ik me nauw verbonden voel					
Ik mis mensen om me heen					
Vaak voel ik me in de steek gelaten					
Wanneer ik daar behoefte aan heb kan ik altijd bij mijn vrienden terecht					

Appendix B: QR invitation to the survey

Onderzoek naar de eigenschappen van de ontmoetingsruimte

Dit onderzoek is ontwikkeld aan de Technische Universiteit Eindhoven en is onderdeel van het **afstudeerproject** van Maxime Langeslag. Het doel van dit onderzoek is om **verbeterd inzicht** te krijgen in de **kenmerken van de ontmoetingsruimtes** in/nabij appartementencomplexen en hierbij heb ik uw hulp nodig!

U kunt deelnemen via onderstaande QR-code. Deze kunt u met vrijwel elke digitale telefoon scannen, waarbij u direct wordt doorverwezen naar de website. Handmatig is dit ook mogelijk door de volgende link over te nemen: <https://tueindhoven.limequery.com/329188?lang=nl>

Ik nodig u graag uit om deel te nemen aan de enquête als u aan de volgende voorwaarden voldoet:

- Minimaal 65 jaar
- Woonachtig bent op deze locatie

Uw bijdrage zorgt voor betere inzichten in de toekomstige ontwikkelingen van (nieuwe) ontmoetingsruimtes! Bij voorbaat hartelijk dank voor uw medewerking aan het dit onderzoek. Mocht u al hebben deelgenomen, wil ik u hartelijk bedanken voor uw tijd en moeite!



Voor vragen en/of opmerkingen kunt u altijd contact met mij opnemen via het volgende mailadres: m.l.w.langeslag@student.tue.nl

Appendix C: Checklist

Neighborhood & building checklist	
Presence of green within walking distance	<input type="checkbox"/> Park <input type="checkbox"/> Courtyard <input type="checkbox"/> Lawn <input type="checkbox"/> Playing field <input type="checkbox"/> Not present
Presence of daily shopping facilities within walking distance	<input type="checkbox"/> Grocery store <input type="checkbox"/> Convenience store <input type="checkbox"/> Drugstore <input type="checkbox"/> Not present
Transportation possibilities within walking distance	<input type="checkbox"/> Bicycle <input type="checkbox"/> Car <input type="checkbox"/> Bus <input type="checkbox"/> Tram <input type="checkbox"/> Train <input type="checkbox"/> Metro
How many floors does the building have?	<input type="checkbox"/> Two or less <input type="checkbox"/> Three to four <input type="checkbox"/> Five to six <input type="checkbox"/> Six to seven <input type="checkbox"/> Eight or more
How many apartments does the building have? Apartments
What type of corridors does the complex have?	<input type="checkbox"/> Individual <input type="checkbox"/> Vertical <input type="checkbox"/> Horizontal
Which common spaces are located in the complex?	<input type="checkbox"/> Entrance hall <input type="checkbox"/> Corridor <input type="checkbox"/> Garden <input type="checkbox"/> Balcony <input type="checkbox"/> Laundry room <input type="checkbox"/> Bicycle parking <input type="checkbox"/> Garage <input type="checkbox"/> Dedicated meeting place

Meeting place Checklist	
Visibility of the meeting place	<input type="checkbox"/> Direction sign(s) <input type="checkbox"/> Entrance sign(s) <input type="checkbox"/> Visible from outside the complex <input type="checkbox"/> Visible from within the complex
Accessibility of the meeting place	<input type="checkbox"/> Stairs <input type="checkbox"/> Lift and stairs
Is the meeting place accessible for less mobile and disabled people?	<input type="checkbox"/> Yes <input type="checkbox"/> No
On which floor is the meeting place located?	<input type="checkbox"/> Ground floor <input type="checkbox"/> First floor <input type="checkbox"/> Second floor <input type="checkbox"/> Third floor <input type="checkbox"/> Higher than third floor
What is the size of the meeting place?	<input type="checkbox"/> 0 – 15 m ² <input type="checkbox"/> 16- 30 m ² <input type="checkbox"/> 31 – 45 m ² <input type="checkbox"/> 46 – 60 m ² <input type="checkbox"/> 61 – 75 m ² <input type="checkbox"/> 76 – 90 m ² <input type="checkbox"/> > 91 m ²
What form does the meeting place take?	<input type="checkbox"/> Square <input type="checkbox"/> Rectangle <input type="checkbox"/> Oval <input type="checkbox"/> Round <input type="checkbox"/> Triangle <input type="checkbox"/> T-shape <input type="checkbox"/> L-Shape <input type="checkbox"/> Other:
Is there natural daylight?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Which type of facilities are present in the meeting place?	<input type="checkbox"/> Toilet <input type="checkbox"/> Kitchen <input type="checkbox"/> Pantry <input type="checkbox"/> Sink <input type="checkbox"/> Bar <input type="checkbox"/> Table(s) <input type="checkbox"/> Desk(s) <input type="checkbox"/> Seating places <input type="checkbox"/> Entertainment (tv, board games, music, etc.) <input type="checkbox"/> Coffee/ tea equipment <input type="checkbox"/> Airconditioning <input type="checkbox"/> WIFI
For what type of activity is the place arranged?	<input type="checkbox"/> Relaxing <input type="checkbox"/> Study/ focus <input type="checkbox"/> Dining <input type="checkbox"/> Meetings <input type="checkbox"/> Parties <input type="checkbox"/> Other:
What type of decoration are present? (cozy environment)	<input type="checkbox"/> Paintings on the wall <input type="checkbox"/> Plants and green within the room <input type="checkbox"/> Bookshelves or other shelves <input type="checkbox"/> None
Is the meeting place easy to reconfigure?	<input type="checkbox"/> Yes <input type="checkbox"/> No

Appendix D: Interview questions (semi-structured)

Interview questions
1. Can you give a short description of the location and the meeting place?
2. When was the meeting place realized?
3. Who organizes these activities?
4. How frequent are the activities organized within the meeting place?
5. How long are the activities?
6. Which activities are hosted within the meeting place?
7. Who is responsible for the meeting place?
8. What is the goal of the meeting place?
9. Does the meeting place achieve its goal?

Appendix E: Data description

The data on **age** was gathered by asking the birthyear of the respondents. This was recoded first into age categories that can be found in Table E1 and further recoded into three age categories: (1) < 70, (2) 71 – 80 and (3) > 80.

Table E1: Recoding of the variable: age

Age	N	%	Recoded into	N	%
60 – 65	5	6.6	< 70	20	26.3
66 – 70	15	19.7			
71 – 75	19	25.0	71 – 80	31	40.8
76 – 80	12	15.8			
81 – 85	14	18.4	> 80	25	32.9
86 – 90	6	7.9			
90 >	5	6.6			
Total	76	100.0	Total	76	100.0

The data on **gender** was gathered by asking what gender the respondents identified themselves with. There were two cased that did not want to specify their gender and they were split into female and male category as can be seen in Table E2.

Table E2: Recoding of the variable: gender

Gender	N	%	Recoded into	N	%
Male	19	25.0	Male	20	26.3
Female	55	72.4	Female	56	73.7
Do not wish to identify	2	2.6			
Total	76	100.0	Total	76	100.0

The data on **migration background** was gathered by asking the respondents about their possible migration background. Three respondents did not wish to identify if they had a migration background and were recoded into the two possible alternatives.

Table E3: Recoding of the variable: migration background

Migration background	N	%	Recoded into	N	%
Yes	12	15.8	Yes	15	19.7
No	61	80.3	No	61	80.3
Do not wish to answer	3	3.9			
Total	76	100.0	Total	76	100.0

The data on **education level** was gathered by asking the respondents their highest completed education. The respondents could choose their education category that were recoded into three categories: (1) low, (2) middle and (3) high. The respondents that had chosen for the option 'Other' indicated their study and based on their input selected into a category, for all cases was 'middle' the corresponding category.

Table E4: Recoding of the variable: age

Education level	N	%	Recoded into	N	%
Primary school	6	7.9	Low	17	22.4
MAVO, VMBO or Lower vocational education	11	14.5			
Secondary vocational education	17	22.4	Middle	35	46.1
HAVO/ VWO	12	15.8			
Higher professional education (HBO)	18	23.7	High	24	31.6
University bachelor/ master	6	7.9			
Other	6	7.9			
Total	76	100.0	Total	76	100.0

The data on household **income** was determined by letting the respondent pick their household income. The income level was categorized as follows: (1) low, (2) middle and (3) high. Many respondents did not wish to share or did not know their level of income. These respondents were categorized in 'low'.

Table E5: Recoding of the variable: household income

Household income	N	%	Recoded into	N	%
Lower than 1,000	2	2.6	Low	21	27.6
1,001 – 2,000	29	38.2			
2,001 – 3,000	21	27.6	Middle	50	65.8
3,001 – 4,000	2	2.6			
Higher than 4,000	3	3.9	High	5	6.6
Do not know/ do not wish to share	19	25.0			
Total	76	100.0	Total	76	100.0

The data on **Physical and Mental health** was based on the self-determined scores of the respondents. In both cases the scores did not need to be recoded and are visible in table E6.

Table E6: Descriptive statistics: physical and mental health

Physical health	N	%
Excellent	3	3.9
Very good	7	9.2
Good	26	34.2
Fair	31	40.8
Poor	9	11.8
Total	76	100.0

Mental health	N	%
Excellent	10	13.2
Very good	14	18.4
Good	28	36.8
Fair	24	31.6
Poor	0	0.0
Total	76	100.0

The data on **volunteer work** or community services was answered by the respondents with a (1) yes or (2) no. Since there were only two options to answer the data did not need any recoding and is visible in Table E7.

Table E7: Descriptive statistic: volunteer work

Volunteer work	N	%
Yes	27	35.5
No	49	64.5
Total	76	100.0

The final personal characteristic is the **household composition** of the respondents. It was recognized that none of the respondents were living with their partner and children, other family members or with friends/others. For a better understanding the variables were recoded in independent and partner.

Table E8: Descriptive statistic: volunteer work

Household income	N	%	Recoded into	N	%
Living alone	60	78.9	Independent	60	78.9
Living with partner	16	21.1			
Living with partner and children	0	0.0	Partner	16	21.1
Living with other family members	0	0.0			
Living with friend(s)/ others	0	0.0			
Total	76	100.0	Total	76	100.0

Social-environmental characteristics

The **partner status** was based on the social interactions with their partner. This characteristic differs from the household composition, since it is possible that respondents do have a partner but are not currently living together. The partner status was based on any social interaction with the partner and categorized as (1) partner and the respondents that indicated 'not applicable' were categorized as (2) no partner.

Table E9: Recoding of the variables: partner status

Partner status	N	%	Recoded into	N	%
Daily	18	23.7	Partner	28	36.8
2 – 3 times a week	6	7.9			
Once a week	2	2.6			
2 – 3 times a month	2	2.6			
Once a month	0	0.0			
Couple of times per half year	0	0.0			
Couple of times per year	0	0.0			
Rarely to never	0	0.0			
Not applicable	48	63.2	No partner	48	63.2
Total	76	100.0	Total	76	100.0

To indicate if the respondents have any (grand) children the social interaction was used. Only the respondents that indicated that they have social interactions with their (grand)children were included and recoded in (1) (grand) children. The respondents that indicated 'not applicable' were recoded into (2) no (grand)children).

Table E10: Recoding of the variable: (grand) children

<i>(grand)children status</i>	<i>N</i>	<i>%</i>	<i>Recoded into</i>	<i>N</i>	<i>%</i>
Daily	6	7.9	(grand)children	52	68.4
2 – 3 times a week	19	25.0			
Once a week	12	15.8			
2 – 3 times a month	9	11.8			
Once a month	2	2.6			
Couple of times per half year	2	2.6			
Couple of times per year	1	1.3			
Rarely to never	1	1.3			
Not applicable	24	31.6	No (grand)children	24	31.6
Total	76	100.0	Total	76	100.0

To indicate if the respondents have any friends the social interaction was used. Having friends was on the same way determined as the partner and (grand)children status. It can be seen that only four respondents indicated that they do not have any friends. This group is so small that it was determined not to be used in further analysis.

Table E11: Recoding of the variable: friends

<i>Friends status</i>	<i>N</i>	<i>%</i>	<i>Recoded into</i>	<i>N</i>	<i>%</i>
Daily	8	10.5	Friends	72	5.3
2 – 3 times a week	12	15.8			
Once a week	14	18.4			
2 – 3 times a month	13	17.1			
Once a month	12	15.8			
Couple of times per half year	9	11.8			
Couple of times per year	3	3.9			
Rarely to never	1	1.3			
Not applicable	4	5.3	No friends	4	94.7
Total	76	100.0	Total	76	100.0

The **building social cohesion** was determined with the neighbor social interactions (visits to and from direct neighbors) and the satisfaction with social contacts from the respondents combined. Both frequencies could have scored between zero and eight and the satisfaction a score between one and five. With a potential neighborhood social cohesion score between one and twenty-three a categorization was made: (1) low, (2) middle and (3) high.

Table E12: Recoding of the variable: building social cohesion

Building social cohesion	N	%	Recoded into	N	%
3	1	1.3	Low	31	40.8
4	1	1.3			
5	5	6.6			
6	18	23.7			
7	6	7.9			
8	3	3.9	Middle	29	38.2
9	6	7.9			
10	5	6.6			
11	5	6.6			
12	2	2.6			
13	2	2.6			
14	6	7.9			
15	6	7.9	High	16	21.1
16	6	7.9			
17	1	1.3			
18	2	2.6			
19	1	1.3			
Total	76	100.0	Total	76	100.0

Physical environmental characteristics

The physical environmental characteristics are based on the checklist and were discussed with the involved committee member(s). Further information was checked by a walk through the complex and were necessary checked with a QGIS map of the location based on public sources.

the distribution of respondents across locations is shown in table E13. The minimum number of respondents from one location is eight and the maximum number is twenty respondents.

Table E13: Distribution of respondents across the locations

Location	Sample (N)	Sample (%)
Location A	10	13.2
Location B	8	10.5
Location C	11	14.5
Location D	12	15.8
Location E	15	19.7
Location F	20	26.3
Total	76	100%

Neighborhood

The **presence of green** was determined by any form of courtyard, large lawn, playing field or park that was within walking distance. Since the checklist was added to the database there was no further need to recode the variable.

The **presence of shopping facilities** was determined by the presence of any grocery store, convenience store or drugstore within walking distance. Since the checklist was added to the database there was no need for recoding the variable.

The **presence of transportation** methods was found to be for almost all the location the same. The locations were accessible by car, bicycle and bus. The only difference was the transportation of the tram and therefore this transportation method was looked in further.

Building

The **size of the community** was determined by the number of apartments within the complex on each location. The exact number was noted for each location and checked with the member of the committee. The number of apartments were categorized in three categories: (1) < 75, (2) 76 – 100 and (3) > 100 apartments.

Table E15: Recoding of the variable: size of the community

Number of apartments	N	%	Recoded into	N	%
45	11	14.5	< 75	41	53.9
51	10	13.2			
55	20	26.3			
84	12	15.8	76 – 100	20	26.3
90	8	10.5			
116	15	19.7	> 100	15	19.7
Total	76	100.0	Total	76	100.0

Low-/medium rise apartment complexes were taken into account with the number of floors for each location. It is noticeable that all six locations have different floor levels. A little recoding was needed in the form of categorization. The numbers of floors were categorized into three categories: (1) 4 – 5, (2) 6 – 7 and (3) 8 – 9.

Table E16: Recoding of the variable: low-/medium rise

Number of floors	N	%	Recoded into	N	%
Four	23	30.3	4 – 5	35	46.1
Five	12	15.8			
Six	10	13.2	6 – 7	30	39.5
Seven	20	26.3			
Nine	11	14.5	8 – 9	11	14.5
Total	76	100.0	Total	76	100.0

Table E14: Descriptive statistics: neighborhood variables

Presence of green within walking distance	N	%
Not present	10	13.2
Present	66	86.8
Total	76	100.0

Presence of daily shopping facilities within walking distance	N	%
Not present	30	39.5
Present	46	60.5
Total	76	100.0

Presence of a tram within walking distance	N	%
Not present	29	38.2
Present	47	61.8
Total	76	100.0

The **common spaces** that were included within the checklist were entrance hall, corridors, balcony, bicycle parking, parking garage, laundry room and the dedicated meeting place. It was noticed that all apartment complexes had an entrance hall, corridors and a dedicated meeting place. In contrast, none of the apartment complexes had a parking garage and laundry room. That taken into account the differences could only be distinguished for the common spaces apartment complexes between the presence of a shared balcony and bicycle parking. In both cases there was no need for recoding.

Table E17: Descriptive statistics; commons paces

Shared balcony	N	%	Shared bicycle parking	N	%
Not present	18	23.7	Not present	8	10.5
Present	58	76.3	Present	68	89.5
Total	76	100.0	Total	76	100.0

Meeting place

The **visibility** of the meeting place was determined through the checklist with regard to four identification possibilities: visible from inside, outside, direction signs and entrance signs. Each visibility indicator was scored with one point and therefore the visibility score ranged from zero to four. There was no need to further recoding.

Table E18: Descriptive statistics; visibility meeting place

Visibility meeting place	N	%
1	20	26.3
2	21	27.6
3	8	10.5
4	27	35.5
Total	76	100.0

The **size** of the meeting place was identified with an exact square meter and put into a category within the checklist. Since there were unselected categories, it was decided to narrow them down and recoded the size of the meeting place into three categories: (1) < 50 m², (2) 51 – 100 m² and (3) > 100 m².

Table E19: Recoding of the variable; size of the meeting place

Size of the meeting place	N	%	Recoded into	N	%
< 31 m2	0	0.0	< 50 m2	12	15.8
31 – 45 m2	12	15.8			
46 – 60 m2	0	0.0	50 – 100 m2	31	40.8
61 – 75 m2	20	26.3			
76 – 90 m2	11	14.5	> 100 m2	33	43.4
> 90 m2	33	43.4			
Total	76	100.0	Total	76	100.0

The **accessibility** of the meeting place indicates how to reach the place within the complex. There are two categories distinguished: (1) stairs and (2) lift and stairs. The **location** indicates on which floor the meeting place is located. The categories are (1) ground floor and (2) first floor. There were only two **shapes** recognizable when visiting the meeting places. Either the meeting place was rectangle or a square. Other forms such as circle, pentagon, triangles and others were not included within the locations. **Reconfigurability** of the meeting place could be answered with a ‘yes’ or ‘no’ and indicates the ease to reconfigure the meeting place to another function. The variables mentioned did not need any recoding and are visible in Table E21.

Table E20: Descriptive statistics; accessibility and location of the meeting place

Accessibility of the meeting place	N	%		Location of the meeting place	N	%
Stairs	10	13.2		Ground floor	45	59.2
Lift and stairs	66	86.8		First floor	31	40.8
Total	76	100.0		Total	76	100.0

Table E21: Descriptive statistics; shape and reconfigurability of the meeting place

Shape of the meeting place	N	%		Reconfigurability of the meeting place	N	%
Rectangle	58	76.3		No	10	13.2
Square	18	23.7		Yes	66	86.8
Total	76	100.0		Total	76	100.0

The **decoration** was based on the checklist and needed to be recoded to a nominal scale for the presence of plants, bookshelves and paintings in the meeting place. Table E22 shows the outcomes after the decoration variable was recoded.

Table E22: Descriptive statistics; decoration

Decoration	N	%
Paintings, bookshelves	20	26.3
Paintings, plants	36	47.4
Paintings, plants, bookshelves	12	15.8
Plants, bookshelves	8	10.5
Total	76	100.0

Table E23: Recoding of the variable; decoration

Decoration recoded into:								
Presence of plants	N	%	Presence of paintings	N	%	Presence of bookshelves	N	%
No	20	26.3	No	8	10.5	No	36	47.4
Yes	56	73.7	Yes	68	89.5	Yes	40	52.6
Total	76	100.0	Total	76	100.0	Total	76	100.0

The **facilities** that were present in the meeting places needed recoding to a nominal scale in order to analyze them. Some facilities were present in all the visited meeting places and could not be individually recoded and analyzed. This was the case for table(s), seating places and coffee/tea equipment.

Table E24: Recoding of the variable; facilities

Facilities recoded into:								
Kitchen present	N	%	Pantry present	N	%	Toilet present	N	%
Not present	12	15.8	Not present	41	53.9	Not present	15	19.7
Present	64	84.2	Present	35	46.1	Present	61	80.3
Total	76	100.0	Total	76	100.0	Total	76	100.0
Entertainment present	N	%	WiFi present	N	%	Airconditioning present	N	%
Not present	33	43.4	Not present	11	14.5	Not present	61	80.3
Present	43	56.6	Present	65	85.5	Present	15	19.7
Total	76	100.0	Total	76	100.0	Total	76	100.0

Table E25: Descriptive statistics; facilities

Facilities present	N	%
Kitchen, Pantry, Table(s), Seating places, Entertainment, Coffee/tea equipment, Airconditioning, WIFI	15	19.7
Toilet, Kitchen, Pantry, Table(s), seating places, Entertainment, Coffee/tea equipment, WIFI	8	10.5
Toilet, Kitchen, Table(s), seating places, Coffee/tea equipment	11	14.5
Toilet, Kitchen, Table(s), seating places, Coffee/tea equipment, WIFI	10	13.2
Toilet, Kitchen, Table(s), seating places, Coffee/tea equipment, WIFI	20	26.3
Toilet, Pantry, Table(s), seating places, Coffee/tea equipment, WIFI	12	15.8
Total	76	100.0

Table E26: Recoding of the variable; experiences of the meeting place

Importance of the meeting place	N	%	Recoded into	N	%
Very unimportant	6	7.9	Unimportant	14	18.4
Unimportant	8	10.5			
Neutral	16	21.1	Neutral	16	21.1
Important	32	42.1	Important	46	60.5
Very important	14	18.4			
Total	76	100.0	Total	76	100.0
Social accessibility	N	%	Recoded into	N	%
Very inaccessible	3	3.9	Inaccessible	6	7.9
Inaccessible	3	3.9			
Neutral	21	27.6	Neutral	21	27.6
Accessible	33	43.4	Accessible	49	64.5
Very accessible	16	21.1			
Total	76	100.0	Total	76	100.0
Atmosphere of the meeting place	N	%	Recoded into	N	%
Very unpleasant	1	1.3	Unpleasant	6	7.9
Unpleasant	5	6.6			
Neutral	27	35.5	Neutral	27	35.5
Pleasant	34	44.7	Pleasant	43	56.6
Very pleasant	9	11.8			
Total	76	100.0	Total	76	100.0
Satisfaction of the atmosphere in the meeting place	N	%	Recoded into	N	%
Very unsatisfied	3	3.9	Unsatisfied	8	10.5
Unsatisfied	5	6.6			
Neutral	26	34.2	Neutral	26	34.2
Satisfied	34	44.7	Satisfied	42	55.3
Very satisfied	8	10.5			
Total	76	100.0	Total	76	100.0

Table E27: Locations and the present facilities within the meeting place

Locations	Facilities								
	Toilet	Kitchen	Pantry	Table(s)	Seating places	Entertainment	Coffee/ tea	Airconditioning	WIFI
1	X	X		X	X		X		X
2	X	X	X	X	X	X	X		X
3	X	X		X	X		X		
4	X		X	X	X		X		X
5		X	X	X	X	X	X	X	X
6	X	X		X	X	X	X		X