The thoughts behind gardens: A qualitative research in the municipality of Leiden on why people have the garden that they have

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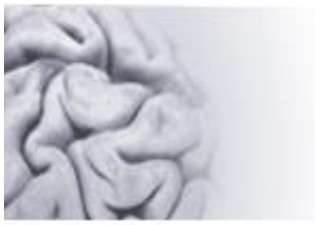

The thoughts behind gardens

A qualitative research in the municipality of Leiden on why people have the garden that they have

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Abstract

In an effort to adjust to global warming the Municipality of Leiden wants to motivate her citizens to take a green garden. Even though there are plenty of campaigns to promote green gardens, most gardens in Leiden are still grey. This qualitative study examined why people have the garden that they have. This was done through an online survey that was answered by 67 garden owners in Leiden. In addition to the main survey a small quantitative part was added to the study in which the relationship between having a green identity and having a green garden was investigated. The study resulted in a complete overview on how garden owners make use of their garden and what influences them in changing it. What prevents garden owners most from making their garden greener are time, money and know how. Furthermore, a moderately positive correlation was found between a green identity and having a green garden. Further research should examine what moderates this relationship.

Keywords: Private gardens, green identity, decision making, biodiversity, garden soil

When one watches the news or follows politics, chances are big climate change, or its effects are being discussed. Climate change and mainly global warming developed itself over time to be one of the biggest problems that mankind faces. The Koninklijk Nederlands Meteorologisch Instituut (KNMI) is a Dutch institution that is specialised climate, climate change and seismology. The KNMI made several reports about the effects of climate change on the Dutch climate. In the future, the KNMI (2015) expects that the average temperatures will continue to rise and that the frequency of soft winters and warm summers will increase. Furthermore, the intensity of rainfall will rise in winter and summer and there are expected to be more dry summers.

1.1. **Importance of a green garden**

One thing that can be done to lessen the effect of climate change in cities is having more green spaces. Bowler, Buyung-Ali, Knight and Pullin (2010) found in their study that areas in cities that are covered in green are on average 1-degree Celsius cooler than grey areas in the same city. This result was also found by Reis and Lopes (2019) who found that with every area bigger than 50m2 the average temperature was 1-degree Celsius cooler than in comparable grey areas. Another possible advantage of a green garden in relation to the environment is the disposal of excessive rainfall water. Autixir et al. (2014), and Zwaagstra (2014) found that soil sealing can prevent water to be absorbed in the ground. This could eventually lead to an overflow in the sewers that could endanger the quality of nearby surface water (Scalenghe & Marsan, 2009). Green gardens also have an effect on biodiversity. Goddard, Dougill & Benton (2010) found in their study that private green gardens in city area’s have a positive impact on the number of animals found in those gardens.

1.2. **What did Leiden try?**

In an effort to adjust to the new climate conditions the municipality of Leiden tried to motivate their citizens through different platforms to increase the number of green gardens. Examples of these platforms are Steenbreek (2021) and GaGoed (2021). One of the campaigns of GaGoed (2021) was for instance the Fleur Je Gevel Op (2021) in which the citizens of Leiden were stimulated to create a green space in their frontage by removing some tiles. Another example is the Week van de groene tuin (2021) campaign in which a gardener gave information about simple ways to make your garden green. The success rate of these campaigns did not seem to be high for owners of grey gardens (Reijnders, 2020). This can also be seen in a study done by Deloitte (2021). Despite all the green garden campaigns in Leiden, Deloitte (2021) found in their study on how green gardens are in the Netherlands that of the 1,336,121 m2 private gardens in Leiden only 467,784 m2 is green. This makes 868,337 m2 of garden space that could still be made green.

1.3. **Studies on private gardens**

Studies on private gardens in the Netherlands could prove useful when creating campaigns to stimulate garden owners to make their garden green(er). Reijnders (2020) investigated why people with a grey garden would not make their garden green despite their wish to do so. One of the main findings of this study is that garden owners see floor tiling as a necessity for making use of the garden. What was also evident is that some garden owners lack the knowledge to make their garden green. A study done by Grieco et al. (2016) investigated why people choose a specific soil sealing. One of their main findings was that social networks play an important role in having a specific garden

where garden owners tend to have the same type of garden as the people in their social network. The influence of a social network is different between city and rural areas where the effect of a social network is less strong in a city area (Grieco et al., 2016). Although these studies are very helpful for studying the motivations behind gardens they have not been done in Leiden. Furthermore, the mentioned studies investigated a specific aspect about gardens potentially missing useful information when a broader view is used.

1.4. **Why is this study done?**

With the potential of 868,337 m2 green garden in mind and because of the lack of success of the green garden campaigns and the lack of a broad and extensive garden study in Leiden, the municipality of Leiden together with University Leiden want to investigate why the private gardens in Leiden are the way they are. To establish as much information on the motivations behind private gardens a qualitative study was done enabling the possibility to create an extensive and complete overview of motivations and reasons for private gardens in Leiden. Discovering why people have the garden that they have can aid in finding ways to create successful campaigns in which people get motivated to make their garden green(er). A higher number of green gardens will lead to a better adjustment to the effects of climate change, and it will benefit the environment greatly. The leading research question to guide the study is as follows:

Why do the citizens of Leiden have the garden that they have?

1.5. **Behavioral theories**

As became clear from the study of Grieco et al. (2016) social networks could play a role in what type of garden a person has. Their explanation mainly involved around the presence of a social norm which garden owners adjusted to if confronted with this norm. This could be placed in the theory of planned behavior by Azjen (1991) in which attitude, subjective norm and perceived behavioral control could lead to an intention to a certain behavior.

Sparks & Shepherd (1992) investigated if self-identity could also be a variable in the theory of planned behavior regarding green consumerism. Indeed Sparks & Sheperd (1992) found that a green self-identity led to greener consumerism whereas in their study the participants who saw themselves as green also chose more often for green products.

Another interesting theory about self-identity and behavior is the self-verification theory. This theory states that people want to be known in such a way as they think of themselves (Stryker and Burke, 2000). This can result in certain behavior like for example buying a specific car that is congruent with the self-identity.

Griskevicius, Tybur & Van Den Bergh (2010) studied the buying behavior of consumers and found that consumers are willing to pay more for a green product than a regular product because of the status that is attached to the green product. Buying a green product is a sign of altruistic behavior which could give that person higher social status than the person with a regular product (Griskevicius, Tybur & Van Den Bergh, 2010). One condition for this to happen is that the product or service needs to be visible for others to see (Brick, Sherman & Kim, 2017). Maybe these constructs can also be used for explaining why people have a certain garden. A garden is something in which person can

express his or her greenness very good. The more plants and natural soil a garden have the better this is for animals and the climate. A garden is in a lot of cases also quite visible for others, being it may be neighbors or visitors of the garden owner that can see what kind of garden they have.

As is clear from the literature described above there are quite some reasons why people with a green identity would rather have a green garden opposed to a grey garden. To investigate the role of a green identity influences what type of garden someone has an additional quantitative part was added to the study next to the main qualitative part. For this part the following hypothesis was proposed:

H1. People who identify as sustainable, and green have greener gardens than people who do not identify as sustainable and green.

2. Method

2.1. **Research design overview**

To investigate why citizens of Leiden have the garden that they have an online survey was held including a qualitative part and a quantitative part. The first part of the study consisted of the qualitative part in which multiple open questions were asked about participants preferences for types of gardens and what their current or future garden looks like. In the second part of the survey which is the quantitative part the participants had to answer on scales from one to seven how much they agreed with statements regarding their green identity, knowledge about the effects of a garden on climate and the ability to change and upkeep their own garden. The decision to perform an online survey was made because the initial plan of doing live interviews was obstructed by the corona virus. Although an online survey gives less of an opportunity to ask further or deeper questions

it still gives a chance to discover what motivates people to change or keep certain things in their garden. Because of this chance the decision was made to carry on with the study instead of solely focusing on the quantitative part of the study.

2.2. **Researcher description**

The research was done by three Master students at University Leiden. Two of the students were in the master Economic and Consumer Psychology and one in the master Organizational Psychology. Before starting their Masters all of them finished the Bachelor of Science in Psychology at the same university. All the researchers grew up in households with gardens which led to a better understanding into people's thoughts about gardens. Next to reading scientific literature about gardens this contributed to choices that were made regarding the direction of this study as the researchers could talk to family and already get a view on how people could look at their own garden. Prior experience from the bachelor thesis contributed to the organization of this study. What also contributed were the statistical courses offered in the bachelor and master which were useful for the analyses of the quantitative part of this study.

2.3. **Participants**

The online survey was filled in by 67 participants. Of these 67 participants 56 are women and 11 are men. The average age of the participants is (M=43.48, SD=9.47) with the youngest being 23 and the oldest 65. In Table 1. an overview is given of what kind of housing contract the participants have as well as the family composition, garden size and the district in which the participant lives.

Table 1

Frequencies of participants who participated in the research (N=67)

	Housing contract	**Family composition**		**Garden size (m2)**		**District of Leiden**	
	Count (%)		Count (%)		Count (%)		Count (%)
Bought	58 (86,6)	Single	6 (9)	< 10m²	4 (6)	Binnenstad-Zuid	0 (0)
Rent	9 (13,4)	Single with children	7 (10,4)	11-20m²	5 (7,5)	Binnenstad Noord	4 (6)
		Living together	12 (17,9)	21-30m²	10 (14,9)	Stationsdistrict	0 (0)
		Living with children	41 (61,2)	31-40m²	10 (14,9)	Leiden Noord	8 (11,9)
		Shared household with friends	1 (1,5)	41-60m²	22 (32,8)	Roodenburgerdistrict	4 (6)
				61-80m²	10 (14,9)	Bos- en Gasthuisdistrict	2 (3)
				81-100m²	1 (1,5)	Morsdistrict	3 (4,5)
				> 100m²	5 (7,5)	Boerhaavedistrict	0 (0)
						Merenwijkdistrict	43 (64,2)
						Stevenshofdistrict	3 (4,5)
Total	67 (100)		67 (100)		67 (100)		67 (100)

2.4. **Recruitment progress**

The recruitment for the survey was done through the social medium channel Facebook. Participants were persuaded to join the study with the foresight of winning one of the money prizes. There were three prizes in total, the first one was a gift coupon of 100 Euro. The second prize was a gift coupon of 50 Euro and the third prize was a gift

coupon of 25 Euro. In the Facebook ads that were posted, a link to the survey was provided. After clicking on the link, the participants were led to the informed consent page of the survey on which they were informed about the procedure of the survey and how the data will be handled. After the participant signed the informed consent the participants were able to start the survey.

The sample size for this study was determent to be 47. This number is based on the requirements for the quantitative part as well as the qualitative part of the study. For the quantitative part of the study it was calculated that the number of participants needed for detecting moderate correlations (.40-.60) with an alpha of 0.05 and a target power of .80 is 47. This is also in line with the requirements for the qualitative part as Mason (2010) found that a minimum of 15 and a maximum of 50 participants are often used in qualitative studies because most of the times after about 20 participants data saturation occurs. To ensure the participant number would not exceed 47 a threshold was installed in the survey software Qualtrics. After reaching this number the survey should have went offline automatically. Unfortunately, while conducting the online survey in Qualtrics some participants clicked right away after finishing the last slides of the survey questions resulting in an 'unfinished' survey. Because of this more than the intended 47 participants filled in the survey. After correspondence with the ethical committee of University Leiden it was allowed to include the extra participants which resulted in 67 participants in total.

2.5. **Participant selection**

At the start of the study the decision was made to only include participants in the age between 18 and 65. This was done to increase the chances for finding participants

that were in the position to have their own garden and being able to actively change it in the future or past. To ensure a balanced design a criterium was implemented in the survey software Qualtrics that a maximum of four participants per district of Leiden was allowed to take the survey. Because of the inclusion of participants that clicked away before finalizing the survey the distribution in the final sample is not even as can be seen in Table 1. The gathering of participants happened through Facebook in which certain groups were selected in which citizens of Leiden are active. These groups were Indebuurt Leiden, Nieuws uit Leiden, Je bent een Leidenaar als, Stevenshof, Merenwijk en Leiden-Noord.

2.6. **Measures**

This study made use of an online survey to gather information about the thoughts behinds gardens in Leiden. In first instance live interviews would be held with the participants but because of the covid 19 pandemic this was not possible anymore. In an effort to continue the study while maintaining a qualitative part in the study the choice was made to use an online survey in which open questions were included. The survey as shown in the appendix B was imported in the software program Qualtrics. At first the participants were asked to fill in the informed consent (appendix A) after which the participants were asked to fill out general information for instance age and in which part of Leiden they live. When the participant fit the criteria that were implemented beforehand the participant could start the main part of the survey. After the main part the second part of the survey started consisting of the statements on which the participants had to fill in if they agreed or disagreed with them. After answering the last part of the survey the participants were asked to upload an picture of their garden. After filling out

all the questions the debriefing (appendix C) form was shown in which the participants were informed about the aim of the study and where they could find more information about the subject.

Main part

The open question part of the survey was designed to gather as much information as possible about the participants thinking patterns about their garden despite the limitations of an online survey. To achieve this, three themes were constructed being: current garden, gardens in general and ideal garden. In the first part of the survey five questions were asked about the current garden. For example, one of the questions was: how would you describe your current garden to someone who has never seen it? After this first part the main questions of this study started. Nine open questions about the motivations behind the participants' garden. For gardens in general one of the questions was: what kind of things do you think are important in a garden and why? And for the construct ideal garden one of the questions was: what things prevent you from making your current garden your ideal garden? For every open question the participant was expected to write at least an answer with 50 characters to prevent the participants from skipping questions or giving a one worded answer.

Quantitative part

The survey ended with 34 quantitative questions in which people had to express how much they agreed with certain statements about their garden or ideals. The constructs that were measured in this part of the survey were self-efficacy, knowledge about gardens and self-identity. For this study only the self-identity construct is relevant for which eight statements were taken from the Connected to nature scale (Mayer &

Frantz, 2004). Participants had to choose their answer on a 7-point Likert scale ranging from fully disagree to fully agree. For example, one of the statements was: often I feel connected to plants and animals. All the items are reliable with Cronbach's Alpha being (α= .85) which is a high reliability. The mean score on this scale was *M*= 5.21 (*SD*= .96).

The green percentage of the participants gardens was calculated through a formula which was made specific for this study: Green-Percentage (GP) = total percentage surface (100%) – estimated percentage soil sealing (eSS) – 0.5* estimated percentage open soil (eOS) – 0.5* estimated percentage water (eW). This formula is based on the amount of coverage that is either good or bad for climate change as previously mentioned. The green percentage score is a scale from 1 to 100 on which 100 is a perfect green garden and 1 is fully grey garden. To verify if the green percentage scores are valid a correlation was made between the scores of the green percentage formula and the scores that were given by two of the researchers. The correlation between the average score of the researchers and the calculated scores from the formula was found to be $r(29) = .87$, $p < .01$. The interrater reliability between the researchers scores was found to be $r(29) = .76$, $p < .01$. This means that the green percentage scores are a valid measure for the amount of greenness in a garden.

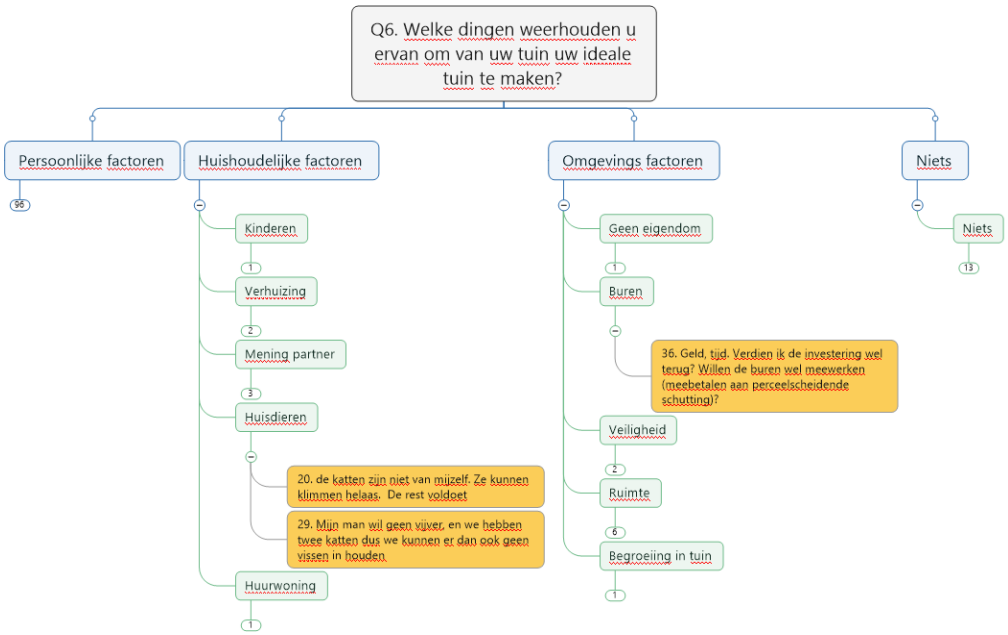
2.7. **Data analyses**

When the data was gathered it was exported from Qualtrics into an Excel file which can be found in the appendix. From here all answers on the open questions were individually imported in Mindjet Mindmanager and coded. This was done according to the framework analysis (Srivastava & Thomson, 2009) in which a start was made by familiarizing with the data. After this phase every answer was coded into a category and

afterwards each category in an umbrella theme. This process was done individually per open question and thus eight different overviews were made. In Figure 1. the oversight for question six is given as an example.

Figure 1.

Overview of answers on question 6.



For the quantitative part a Pearson correlation was performed between the independent variable identity and the dependant variable green percentage. All quantitative data from the survey was analysed with IBM SPSS statistics 25. Because two participants did not fill in the questions on the quantitative part of the study they were excluded from the analyses. Furthermore, no outliers were present in the dataset and all assumptions were met.

3. Results

3.1. Question 1

In this section the answers on the open questions in the survey will be examined. As can be seen in Figure 2 and Figure 3. a majority of the respondents describes green elements in when they talk about their garden. Elements that were mentioned most that were coded under the term green were plants, grass, trees and flowers. What was also mentioned often was the presence of a vegetable garden. Next to green elements respondents also often describe objects in their garden, for instance seating places like a lounge set, playground equipment for children or a garden shed. What stands out in this theme is that almost all participants describe a seating area in their garden. The participants sometimes add how nice their seating area is for example participant number 51: ‘’Sunny garden with many different plants, birds and insects with a nice area to sit in.’’.

Figure 2.

How do the respondents describe their garden? Frequency of mentioned garden elements and the percentage

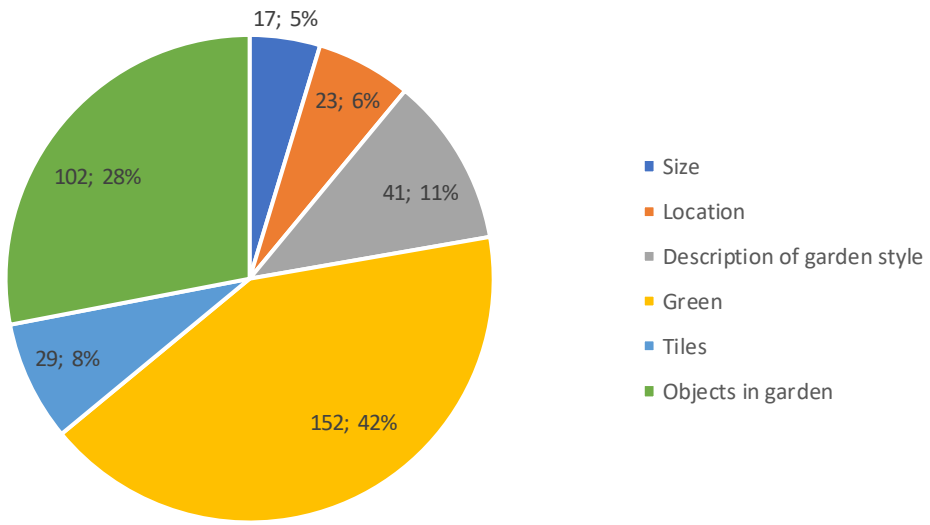
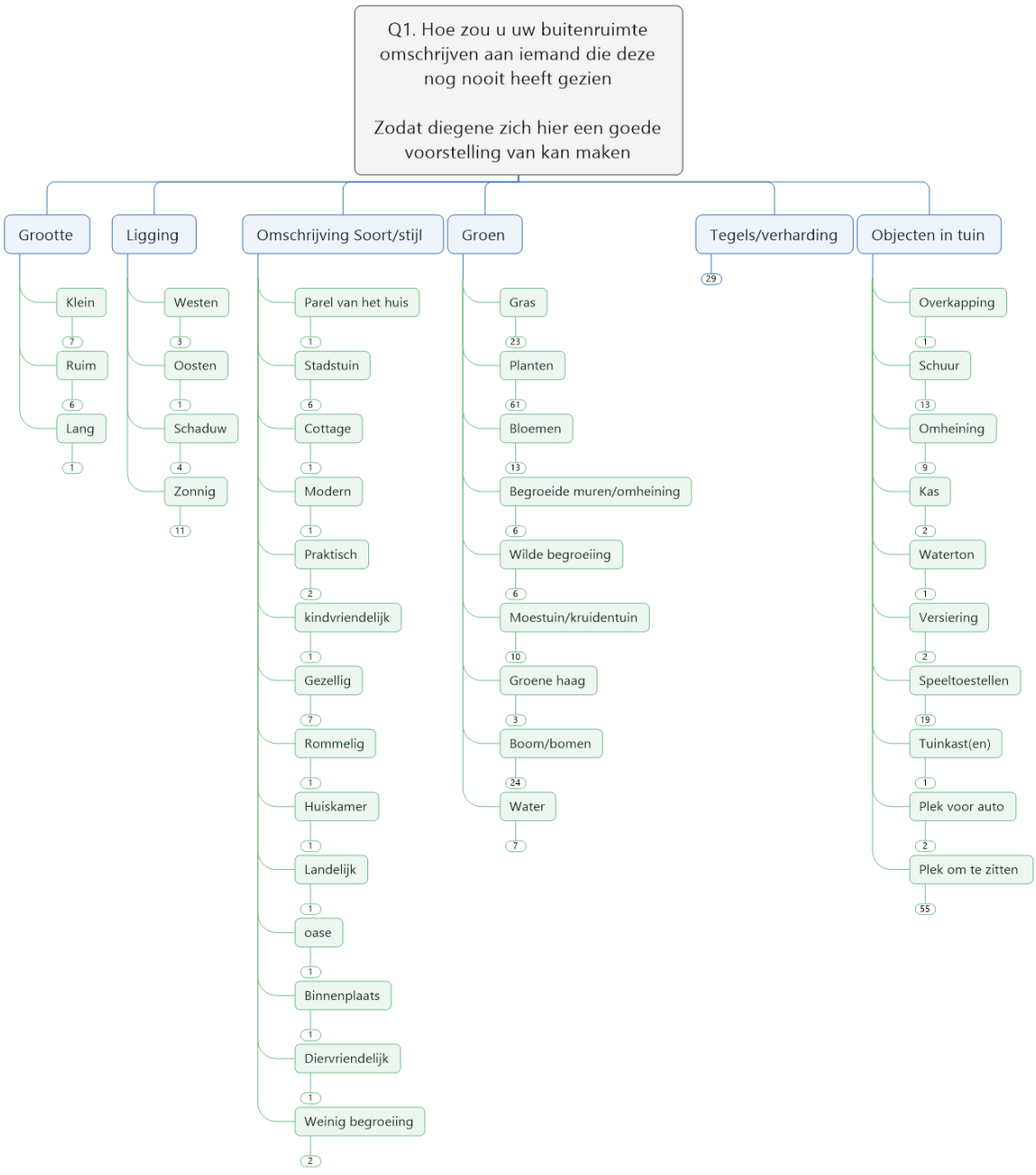


Figure 3.

Overview of descriptions of gardens.

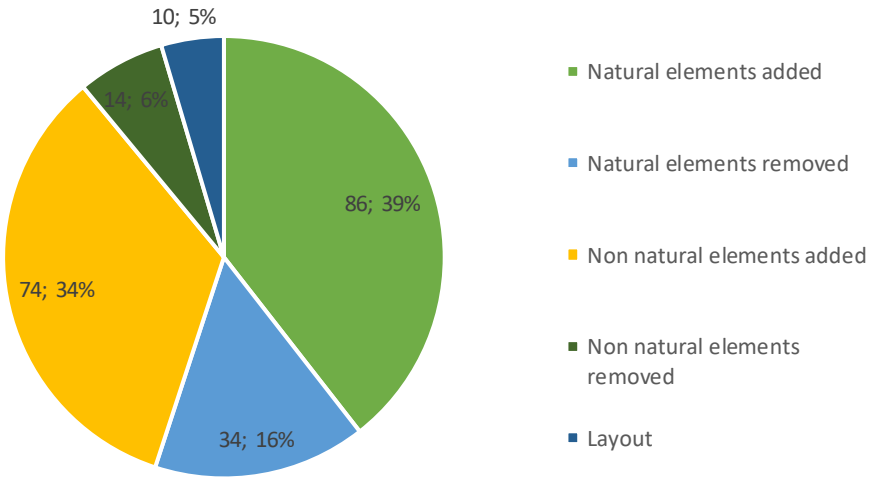


Question 2a

In the next question of the survey the respondents were asked about any changes they made when they became the owner of their current garden. The reason for this question was to get a clear image of the things people change the most in their new garden. As can be seen in Figure 4 the respondents added natural elements the most in their new gardens. Within this category the respondents mentioned most that they added plants, grass fields, natural borders and trees. The second most added elements that the participants talk about are non-natural elements. In this category participants often mention they added a tile floor and garden fences.

Figure 4.

What did the respondents change in their garden? Frequency of mentioned garden elements and percentage.



Question 2b

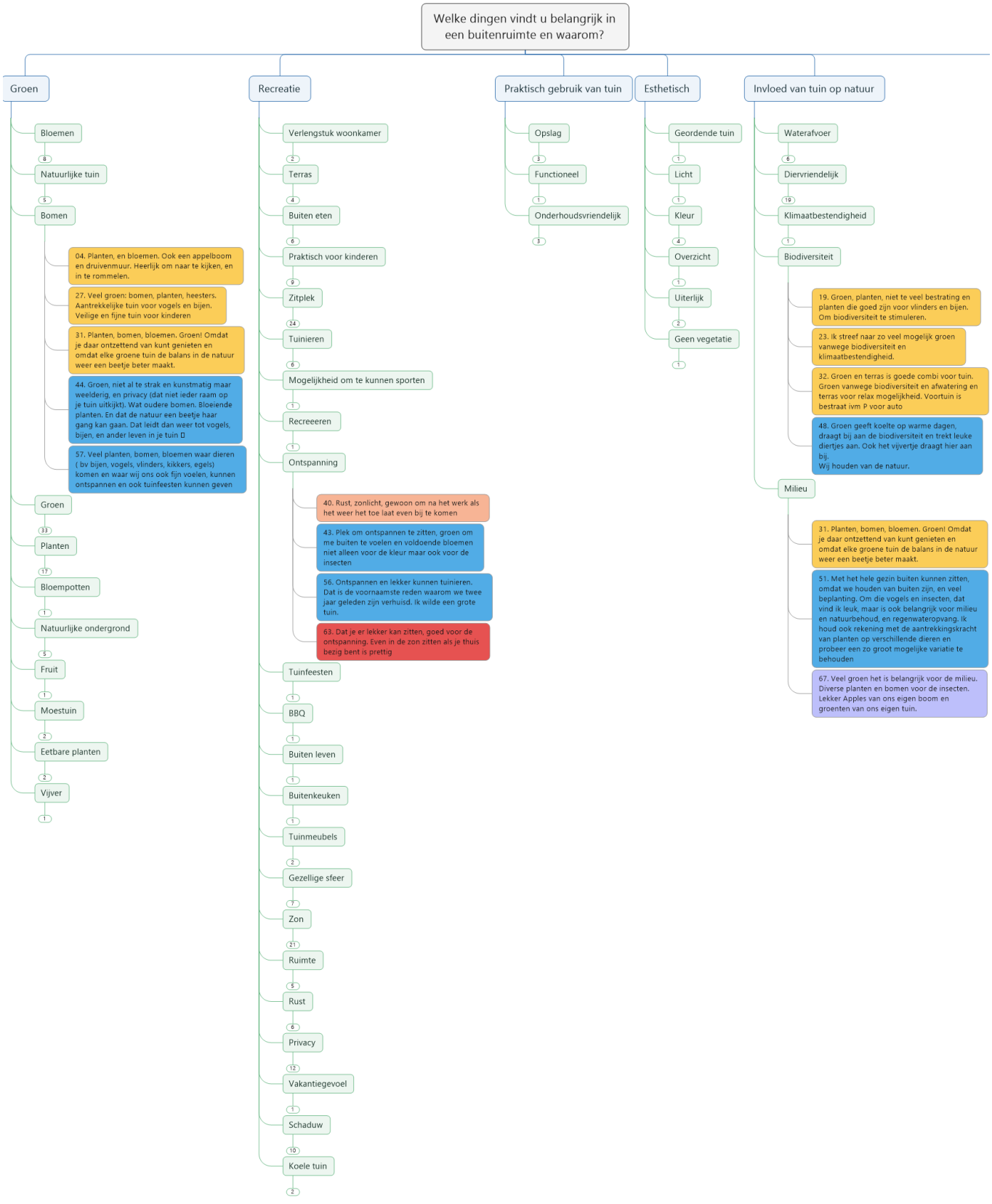
The reason why participants add natural or non-natural elements in their garden can be found in the next open question. In this question the participants were asked why they made certain changes in their garden. What stands out for people that decide to take a tile floor is the fact that these participants think it is practical and maintenance friendly. On these tile floors they can add sitting areas and other garden furniture which enhance the comfort level of the garden. Opposed to this climate unfriendly element a lot of participants also expressed that they added plants and grass fields. The main reason for participants to add plants in their garden is simply because they prefer a green garden over grey garden. The participants express that these natural elements make increases their happiness when being in their garden. In a few cases participants also show their interest in caring for nature as they mention biodiversity and the presence of insects as a reason to add plants in their garden. In contrast to the preference for plants, the category 'natural elements removed' consists mostly of participants who removed plants for their garden. The reason for this is mostly because the participants mow down weeds that were growing uncontrollably. Most of the participants that said to have removed plants in fact kept their own plants and just removed the weeds that were overflowing their garden.

Question 4

The next question that will be discussed is question four: what aspects in a garden do you think are important and why? In Figure 5 an overview is given of all the answers of the participants on this question.

Figure 5.

Overview of the answers on what people think is important in a garden



As can be seen in the overview a lot of participants mention that they think a green garden is important. While some just express their preference for a green garden, other participants also make the connection between a green garden and the favourable effects of this kind of garden on nature and the climate. Water disposal, biodiversity, environment and animals are all mentioned as a reason for the preference of a green garden. The participants especially mention animals a lot in this theme with the animals named most being insects. This is illustrated by the answer of participant number 28: ‘’Much green, flowers etc Also grass. Good for bees, butterflies etc, and hedgehog friendly.’’.

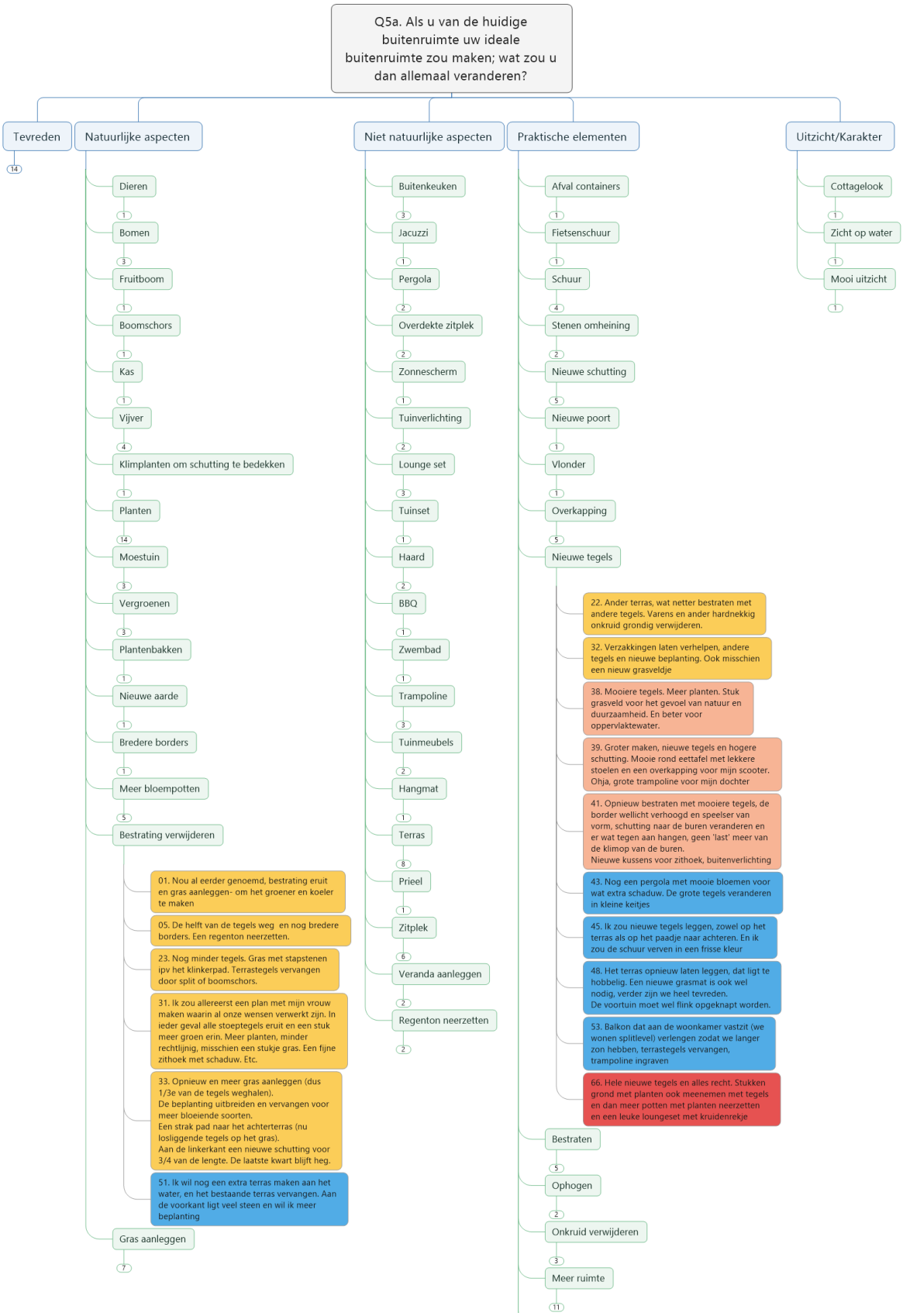
Apart from the focus on green elements when participants mention what they think is important in a garden the other big focus lays on recreation in the garden. A lot of participants express that they think a good seating area in a garden is important. The seating areas are used to relax and enjoy the sun or shadow when sitting outside. This can elevate the feeling of peacefulness and increases the feeling of enjoyment when participants make use of their garden. What is also mentioned quite often when the participants talk about recreation in a garden is child friendliness. The participants that mention this think it is important their children can play safely in their garden.

Question 5a

In the next question the participants were asked what they would change in their current garden if they would make it into their ideal garden. Figure 6 shows again all the themes in which the answers of the participants were categorized.

Figure 6.

Overview of things garden owners would change to make their ideal garden.



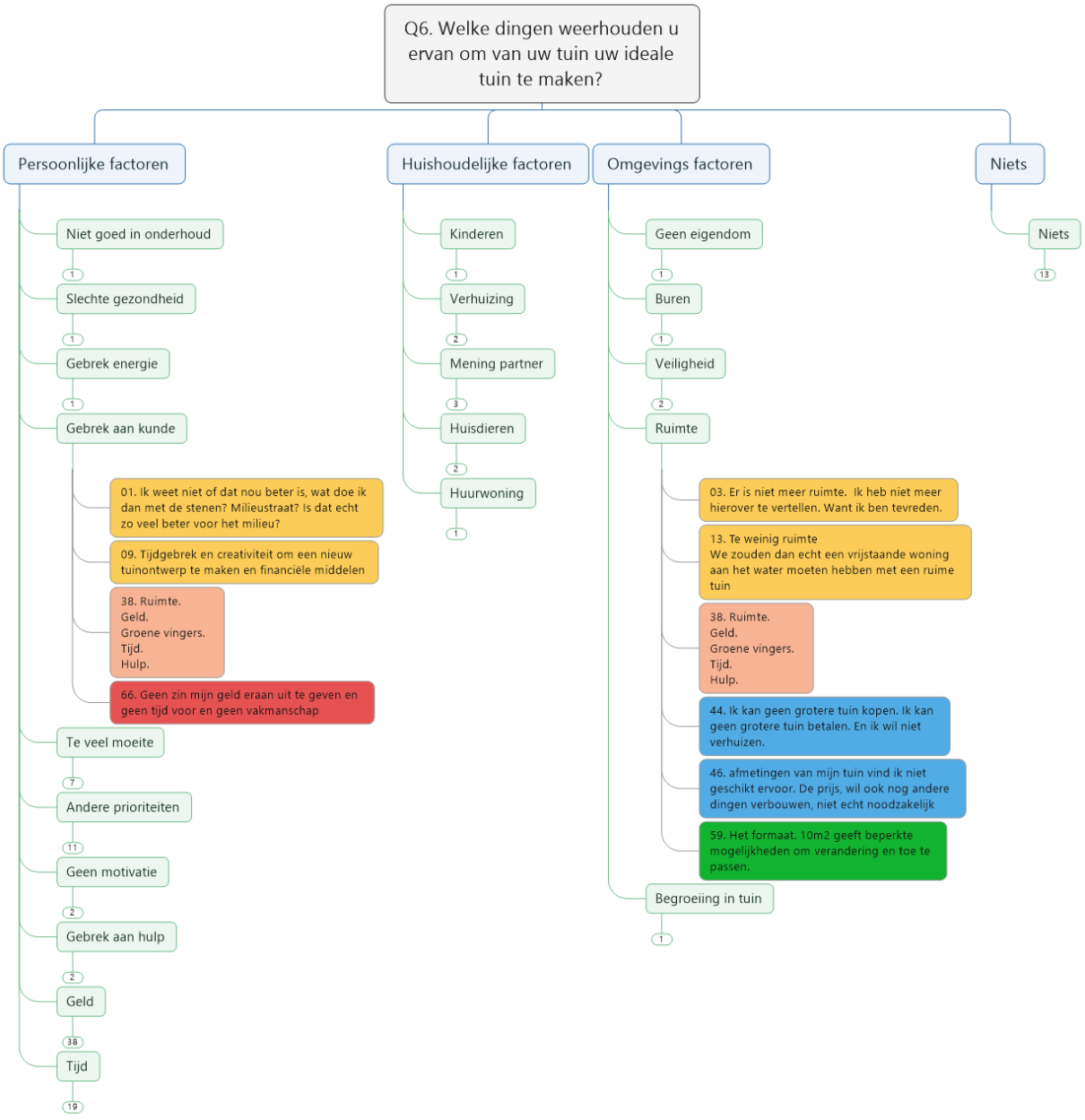
A significant group of participants is already satisfied with their current garden and describe it as their ideal garden. Apart from these participants there is almost an equal distribution between the mentioning's of natural elements, non-natural elements and practical elements. In the category natural elements, the participants mentioned the most that they would like to add plants, grass, natural soil (tile removal) and ponds. On the other hand, for the non-natural elements the participants also wish for new seating areas and tile floors. Practical elements that the participants would like to add to their garden are sheds, canopies and garden fences. What is also interesting to observe is that eleven participants mentioned that they want more space in their garden.

Question 6

What withholds participants to change their garden and make it potentially greener? In question 6 the participants were asked what the reasons are for not making their current garden their ideal garden. In the diagram below an oversight is given of the answers of the participants. As can be seen in figure 4 the majority of the reasons for not changing a garden are personal reasons. Within personal reasons the most frequently answered reason was money. Two also often mentioned reasons are lack of time and lack of priority. Most of the time lack of money and time are mentioned simultaneously. The group of participants that lacks money and time would, if not hindered, about equally make their garden green or grey. Next these reasons participants also expressed the lack of motivation make big changes in their garden.

Figure 7.

Reasons that withhold participants to change garden.



3.2. Quantitative questions

As can be seen in the answers on question 4 of the survey a lot of participants describe the importance of the environment and biodiversity. To determine if a green identity is

connected to having a green garden rather than having a grey garden a Pearson correlation was performed between the green percentage score and the green identity score. Green identity and green percentage were found to be moderately positively correlated, $r(63) = .29$ $p = .022$.

4. Discussion

One of the main questions that the municipality of Leiden struggles within regard to adapting to a new climate is how to motivate their citizens to create or maintain a green garden. This study attempted to create a clear image of the reasons why people have the garden that they have. From the survey data a huge amount of information was gathered from which can be explained why garden owners have the garden they have.

Even though most of the participants expressed their preference for a natural garden the number of grey gardens was higher. This is in accordance with the findings in previous studies done by Kullberg (2016) and Grieco et al. (2016).

Furthermore, just like was found in the studies of Kullberg (2016) and Beumer (2017) one of the main aspects for garden owners which prevents them from having a greener garden is the presence of a tile floor. The tile floor is expressed by garden owners as one of the key components that make it possible to enjoy their garden. The tile floor allows them to create seating areas which are used to enjoy the garden which is the most important thing for garden owners. They do this by for instance by relaxing in the sun, meeting with friends or family and being close to nature like flowers and plants.

What stands out in the findings of this study is the amount of garden owners that expressed their knowledge about the effects of their garden on wildlife and the environment. In the study done by Grieco et al. (2016) there seemed to have been a

bigger knowledge gap between the type of garden one has and the effect of this garden on the environment. What became clear from the owners of green gardens in this study is that they most of the times specifically chose a green garden because they know how it can positively influence the environment. This could imply that as the years turned by, garden owners gained more knowledge about the positive effects a green garden has on the environment and biodiversity.

Furthermore, what stands out in this study are the answers on the question what garden owners prevent from making their current garden ideal. In this study it became clear that money, time and skills prevent garden owners from potentially making their garden greener.

Next to the main part of the study in the second part it was examined if having a green identity is a predictor for having a green garden. The results show that indeed there is a moderate positive correlation between having a green identity and having a green garden. This could mean that as theorized before the self-verification theory of Stryker and Burke (2000) plays a role in how garden owners aim to express their green identity in their garden. Because a moderate correlation was found between a green identity and having a green garden it is likely other factors come into play. An underlying factor could be the level of publicness of a garden. This was implied by some participants as it was mentioned they changed their garden to make it look tidy for the neighbors that had a good view on those gardens. Furthermore, the size of a garden also seems to be a predictor for having a green garden. As well as in the study of Kullberg (2016) it was found that having a bigger garden leads to having a greener garden.

4.1. **Implications**

The findings in this study could prove useful for the Municipality of Leiden in creating new campaigns aimed at stimulating garden owners to make their garden green(er) and further research. Clear motives and thoughts behind gardens in Leiden were subtracted from the survey data including barriers that withhold garden owners from making their garden green(er). When these barriers are lifted the chances of a successful campaign will increase. One of the reasons this study was useful to do was the broad view that was taken. Previous studies that were mentioned above like Grieco et al. (2016) and Reijnders (2016) focused on a specific garden owner type, for instance garden owners with a fully tiled garden floor. By taking a broader view more motives and information became clear about other kind of garden owners as well. For instance, garden owners with a garden that falls between grey and green. If the Municipality of Leiden wants to reach the protentional of 868,337 m2 extra green garden it would be wise to aim the campaigns on a broad population instead on focussing on a specific group.

From the quantitative part of the study more research is needed to discover what role a green identity exactly has in garden behavior. As mentioned, there was a moderate correlation between a green identity and having a green garden. Further research should prove what other factors play a role next to a green identity. As mentioned maybe the publicness of a garden in relation to a green identity plays a role in the decisions garden owners make in their garden.

4.2. **Limitations**

Because of the global Covid-19 pandemic the original design of the study had to be cancelled and thus instead of interviews an online survey was made with the question

that were planned to be asked in an interview. Sadly because of these circumstances the data in this study is not as extensive as planned. During a recorded interview there is much more freedom to delve deeper into certain topics and ask for more detailed answers. Despite the somewhat limited answers from the survey, it was still possible to find the most important reasons for why people have the garden that they have, but in a lot of answers more information could have been extracted if it was done in an interview. Furthermore, the intended participant number was greatly exceeded which caused a big increase in the amount of data which also resulted in an overrepresentation of garden owners in the neighbourhood Merenwijk. Questions could be asked how representative this sample is for other neighbourhoods in Leiden.

4.3. **Conclusion**

In conclusion this study revealed an extensive overview of the thoughts and motivations behind gardens. In line with other studies, it was found that garden owners really enjoy spending time in their garden to relax, socialize and enjoy nature. Many participants expressed that they care about nature in their garden and think it is important. Despite this the majority of the participants still have a grey garden or a garden in-between grey and green. The most common reasons for garden owners to not make their garden greener is a lack of time, money and know how. Furthermore, it was found that a green identity leads to having a greener garden. Because the correlation is moderate more research is needed to find out what influences this relation. Despite the limitations and the big overhaul in the study design because of the Covid-19 pandemic, the findings of this study could be useful in creating new campaigns that aim to stimulate garden owners in Leiden to make their garden green(er).

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Appendix A

Informed consent
Dear Sir / Madam,
Do you have an outdoor area on the ground floor? Then you can help us graduate! For our master's program at Leiden University, we conduct research into outdoor areas and we could really use your help with this! We would like to find out more about your outdoor area by means of a short questionnaire of max. 15 minutes. No matter what your outdoor area looks like, every outdoor area contributes to our research! In addition to helping us, you also have a chance to win a gift card of €100, €50 or €25 (Bol.com) if you participate.
More information: This research has been approved by the Psychology Ethics Committee of Leiden University. Participation in this research is completely voluntary. If you wish to opt out of participating, you can do so at any time. You do not have to give a reason for this.
What happens with my data? Your answers will be associated with a unique code and the results of this survey will only be reported at the group level. It is therefore not possible to trace from research reports to whom the data relates.
How do I win a gift card**?** If you would like to be in with a chance of winning a gift card, please enter your email at the end of this questionnaire. If you win a gift card, we need a number of additional personal data from you (address, IBAN account number and Name of this account number). This personal data will be stored separately from the research data and shared with the financial administration of Leiden University, which will pass this information on to the Tax Authorities. The University is legally obliged to declare the compensation you receive to the Tax Authorities. Whether the tax authorities will levy tax on this payment depends on your personal situation.
Do you have any questions? If you have any further questions about this research or your rights, or if you would like to raise a complaint or concern about this research, please contact us (tuinenvanLeiden@gmail.com), or our teacher, Anouk van der Weiden (a.van .der.weiden@fsw.leidenuniv.nl). She works in the Department of Social, Economic and Organizational Psychology and is the principal investigator on this project.

Yours sincerely,
Freek Soetermeer, Karlijn Kranenburg & Roza Speksnijder *The research team*

I declare that:

▢ I understand the information about this study, and that I have had the opportunity to ask questions about the study; (53)

▢ I understand that my data will be collected and processed in encrypted form; (54)

▢ I understand that I can stop my participation at any time, without having to give a reason, and what the consequences will be for my reward; (55)

▢ I give permission to participate in this research. (56)

Check In order to participate in this study, you must have an outdoor area in Leiden on the ground floor with a natural surface.
For example, a front garden, backyard, courtyard, courtyard, etc.

Pay attention: A balcony or roof terrace do not fall within this categoryI

meet this requirement (1)

Appendix B

Start This questionnaire consists of 4 parts and will take a maximum of 15 minutes

Part 1: General
Part 2: Features of your outdoor area
Part 3: Open questions about your current and ideal outdoor area
Part 4: Statements about your outdoor area

Part 1 Part 1: General
5 questions

Part 1.1 What is your gender?

- ○ Male (1)
- ○ Female (2)
- ○ Other (3)

Part 1.2 What is your age?

_____

Part 1.3 In which neighborhood in Leiden do you live?

- ○ 0. Binnenstad-Zuid (141)
- ○ 1. Binnenstad Noord (142)
- ○ 2. Stationsdistrict (143)
- ○ 3. Leiden Noord, (144)
- ○ 4. Roodenburgerdistrict (145)
- ○ 5. Bos- en Gasthuisdistrict (146)
- ○ 6. Morsdistrict (147)
- ○ 7. Boerhaavedistrict, (148)
- ○ 8. Merenwijkdistrict, (149)
- ○ 9. Stevenshofdistrict (150)

Part 1.4 Do you have a house to rent or an owner-occupied home?

- ○ Rental house (1)
- ○ Owner-occupied home (2)
- ○ Other, namely (3) _____

Part 1.5 What is your family composition?

- ○ Single (1)
- ○ Single with children (2)
- ○ Living together (3)
- ○ Living together with children (4)
- ○ Other, namely (5) _____

Part 2. Part 2: Characteristics of your outdoor area
3 questions

2.1 What is your most important outdoor area (e.g. front yard, backyard, courtyard, courtyard, flat, etc.)

_____

2.2 What is the approximate surface area (m²) of your main outdoor area?

- ○ < 10m² (2)
- ○ 11-20m² (3)
- ○ 21-30m² (4)
- ○ 31-40m² (5)
- ○ 41-60m² (6)
- ○ 61-80m² (7)
- ○ 81-100m² (8)
- ○ > 100m² (9)

2.3 Explanation The next question is about the layout of the surface of your main outdoor area, for this question use the image below with surface types.

1. Ground Cover
For example: tiles, gravel, stones, pebbles, artificial grass, wood, cement, decking, etc.
2. Open ground
For example: sand, mud, garden soil, wood chips, tree bark, etc.
3. Vegetation
For example: plants, flowers, grass, trees, weeds, ivy, mushrooms, moss, hedge etc.
4. Water
For example: pond, ditch, natural pool, etc.

2.3 Can you estimate the ratio of surface types (see picture) covering your main outdoor area? The sum of the areas together must be 100 %.
For example: 50% ground cover, 30% vegetation, 10% water and 10% open ground.

Note: This estimate concerns the surface area of your outdoor areas. The height of the vegetation does not play a role in making this estimate (the place the vegetation occupies in the surface does).
- Vegetation in a container on ground cover does count as vegetation
- Small areas of open ground between plants do not count as open ground

_____ 1. Ground cover (37)
_____ 2. Open Ground (38)
_____ 3. Vegetation (39)
_____ 4. Water (40)

2.4a How green do you think your most important outdoor area is?

	Not green								Very green	
	0	1	2	3	4	5	6	7	8	9	10
Move this bar ()											

2.4b Why do you think this?
(Why did you put the bar in the above position)

_____

_____

_____

_____

_____

Explanation **Part 3**: In the next part of the questionnaire, some **open questions** are asked about your **current outdoor area** and your **Ideal outdoor area**. The purpose of these questions is to get as complete a picture as possible of your outdoor area.
Try to answer these questions as completely as possible.

3.1 How would you describe your outdoor area to someone who has never seen it
So that they can get a good idea of this

_____

_____

_____

_____

_____

3.2a Can you **name** a number of **things** in your outdoor area that you have (consciously) changed since you moved here?

_____

_____

_____

3.2b Can you indicate **why** you have (consciously) changed these things?

Page Break

3.3a Can you **name** a number of **things** in your outdoor area that you have (consciously) **kept** since you came to live here?

3.3b Can you indicate why you have (consciously) kept these things?

3.4 What things do you find **important** in an outdoor area and **why**?

_____

_____

_____

_____

_____

3.5 If you were to turn your current outdoor area into your **ideal outdoor area**; **what** would you **change** then?**?**

_____

_____

_____

_____

_____

Q37 **Why** would you change all of this above?

_____

_____

_____

_____

_____

3.6 What are the things that **keep** you from turning your current outdoor area into your ideal outdoor area?

area

_____

_____

_____

_____

3.7 On a scale of 1 to 10, how much do you value your outdoor area **right now**?

0 1 2 3 4 5 6 7 8 9 10

Move this bar ()	

3.8 On a scale of 1 to 10, how much value did you attach to your outdoor area **before** the outbreak of the **Corona pandemic**?

0 1 2 3 4 5 6 7 8 9 10

Move this bar ()	

Explanation **Part 4**: You have arrived at the **last part** of the questionnaire
In this section you will find some **statements** that give us insight into how you view certain aspects of your outdoor area. You can answer the statements on a **7-point scale** in which 1 = completely disagree and 7 = completely agree with the statement.
There are no right or wrong answers, choose the answer that best suits you

5.1 Please indicate below to what extent you agree or disagree with the following statements about the **maintenance** of **greenery** (trees, plants, flowers, natural surface, etc.) in your outdoor area:

	1. Completely disagree (2)	2. Largely disagree (3)	3. Somewhat disagree (4)	4. Neutral (5)	5. Somewhat agree (6)	6. Mostly agree (7)	7. Totally agree (9)
1. I know how to maintain the greenery in my outdoor area (1)	○	○	○	○	○	○	○
2. It is difficult for me to maintain the greenery in my outdoor area (2)	○	○	○	○	○	○	○
3I have sufficient skill to maintain the greenery in my outdoor area (3)	○	○	○	○	○	○	○
4. I have enough money to maintain the greenery in my outdoor area (4)	○	○	○	○	○	○	○
5. I have enough time to maintain the greenery in my outdoor	○	○	○	○	○	○	○

area (5)

5.2 Please indicate below to what extent you agree or disagree with the following statements about making your outdoor area **greener** (application of trees, plants, flowers, natural surface, etc.):

	1. Completely disagree (1)	2. Largely disagree (2)	3. Somewhat disagree (3)	4. Neutral (4)	5. Somewhat agree (5)	6. Mostly agree (6)	7. Totally agree (7)
1. I know how to make my outdoor area greener (1)	○	○	○	○	○	○	○
2. It is difficult for me to provide my outdoor area with more greenery (2)	○	○	○	○	○	○	○
3. I have enough skill to green my outdoor area (3)	○	○	○	○	○	○	○
4. I have enough money to make my outdoor area greener (4)	○	○	○	○	○	○	○
5. I have enough time to make my outdoor	○	○	○	○	○	○	○

area greener (5)	

5.3 Indicate below to what extent you agree or disagree with the statements below about the **contribution** that your outdoor area can make with regard to the **drainage of rainwater** in Leiden.

	1. Completely disagree (1)	2. Largely disagree (2)	3. Somewhat disagree (3)	4. Neutral (4)	5. Somewhat agree (5)	6. Mostly agree (6)	7. Totally agree (9)
1. My outdoor area can contribute to the drainage of rainwater (8)	○	○	○	○	○	○	○
2. My outdoor area can reduce the risk of flooding in Leiden (9)	○	○	○	○	○	○	○
3. The contribution my outdoor area can make to the drainage of rainwater is negligible (10)	○	○	○	○	○	○	○
4. My outdoor area cannot make a big difference in reducing the risk of flooding in Leiden (12)	○	○	○	○	○	○	○

5.4 Please indicate below to what extent you agree or disagree with the statements below with regard to the **contribution** that your outdoor area can make in **reducing heat** and **lowering the temperature** in Leiden.

	1. Completely disagree (4)	2. Largely disagree (5)	3. Somewhat disagree (6)	4. Neutral (7)	5. Somewhat agree (8)	6. Mostly agree (9)	7. Totally agree (10)
1. My outdoor area can contribute to a cooler environment (4)	○	○	○	○	○	○	○
2. My outdoor area can contribute to lowering the temperature in Leiden (7)	○	○	○	○	○	○	○
3. My outdoor area can make a major contribution to the reduction of heat in its environment (6)	○	○	○	○	○	○	○
4. The contribution that my outdoor area can make with regard to lowering the temperature in Leiden is negligible (8)	○	○	○	○	○	○	○

5.5 Please indicate below to what extent you agree or disagree with the statements below regarding your **ideals**.

	1. Completely disagree (1)	2. Largely disagree (2)	3. Somewhat disagree (3)	4. Neutral (4)	5. Somewhat agree (5)	6. Mostly agree (6)	7. Totally agree (7)
1. I experience a sense of oneness with the nature around me. (1)	○	○	○	○	○	○	○
2. I recognize and appreciate the intelligence in other living organisms (2)	○	○	○	○	○	○	○
3. I often feel related to animals and plants (3)	○	○	○	○	○	○	○
4. As a tree can be part of a forest, I feel part of the natural world (4)	○	○	○	○	○	○	○
5. I often feel that I have no connection with nature (5)	○	○	○	○	○	○	○
6. I fully understand the impact my actions have on	○	○	○	○	○	○	○

nature (6)							
7. I don't feel related to animals and plants (9)	○	○	○	○	○	○	○
8. My personal prosperity is independent of the prosperity of nature (10)	○	○	○	○	○	○	○

Photo (optional) Would you like to upload a photo of your main outdoor area?
This could help us map the different types of outdoor area in Leiden

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Closing As mentioned before, participants in this study have a chance to win a gift card of €100, €50 or €25 (Bol.com). If you **win** one of the gift cards, we need your IBAN, name and address details. We will only contact you in this case to obtain this information.

To be in with a chance of winning one of the gift cards, enter your **email address**:

_____

Appendix C

Debriefing

First of all, we would like to thank you for participating in our research.

Below we will give you a little more **explanation** about why we do this research.

With this research we hope to find out why Leiden residents have arranged their outdoor area the way it is. About 40% of Leiden consists of gardens, which can play a major role in solving a number of (climate) problems.

1. One of these problems is the drainage of rainwater. In the event of large amounts of rain, the sewers become overloaded and water problems can arise. An important solution to this problem is more natural substrate (such as grass, plants, trees, soil, or water). The water can be absorbed better via a natural subsoil and fewer problems arise in the sewer system.
2. Another advantage of an outdoor area with a lot of natural substrate is that animals have more chances to survive.
3. Residents of Leiden themselves can also experience the benefits of greener outdoor areas. In the city it is generally a few degrees warmer than in surrounding areas. This is called the heat island effect. The more natural soil, the less heat is absorbed by, for example, stone terraces. Greener outdoor areas can therefore provide cooling in hot summers.
4. Finally, research has shown that nature is good for health and well-being. The results of this survey will only be shared anonymously and at group level (i.e. never your individual data). Among other things, we plan to share the results with the municipality of Leiden. If you object to this, you can let us know and we will not include your data in our analyses.

Do you have more questions or would you like to be kept informed about the research? Then you can email us at tuinvanLeiden@gmail.com or contact the principal investigator, Anouk van der Weiden (a.van.der.weiden@fsw.leidenuniv.nl).

If you want to view your own data, you can do so by stating your **unique participant code**:**0000000** So keep this code safe!

We hope you enjoyed participating. Your contribution to our research is highly appreciated. Thanks again for your participation!

Yours sincerely,

Freek Soetermeer , Karlijn Kranenburg & Roza Speksnijder *The research team*