

Greenspaces and perceived mental wellbeing during COVID-19

How does visiting greenspace influence perceived mental wellbeing during the COVID-19 pandemic?

A case study on the inhabitants of the Province of Groningen

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Summary

Several studies have been conducted investigating the impact of the COVID-19 pandemic and its restricting measures on individuals' mental wellbeing. Feelings of uncertainty, fear, anger, frustration and loneliness might arise as the measures might include social distancing and isolation. Greenspaces are considered to be places of relaxation, exercise, solace and respite during the pandemic, however, qualitative research on the relationship between mental wellbeing and greenspace is missing in existing literature. This research aims to provide context by answering the question: How does visiting greenspace influence perceived mental wellbeing during the COVID-19 pandemic. Hence nine interviews with urban and rural residents of Groningen were conducted. In conclusion, it was found that the pandemic harmed individuals' mental wellbeing, as it led to less face-to-face contact and being more homebound. Furthermore, overall, greenspaces were visited more frequently during the pandemic and gained a social function next to its function to provide a break from working from home. New greenspaces were increasingly visited as interviewees had more time for this and an increased desire to see new things. Visiting greenspace helped to alleviate stress and it was perceived as peaceful and serene, positively impacting perceived mental wellbeing.

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1. Introduction

Mental health related diseases can be regarded as a leading cause of disability worldwide, therefore preventative measures increasing mental wellbeing are promoted (WHO,2013). The impact of natural environments and greenspace on human health has gained increasing interest in the research community (American Public Health Association, 2013; Bowler et al., 2010; Houlden et al., 2019). The importance of greenspace is stressed by the WHO Regional Office for Europe, stating that urban greenspaces could be considered as a “necessary component for delivering healthy, sustainable, liveable conditions” (2016, pp.8). Research by Houlden et al. (2019) found that greenspace is positively associated with mental wellbeing. Furthermore, natural environments’ intrinsic qualities, often associated with greenspaces, are believed to have a positive effect on wellbeing and health (Bowler et al., 2010). Additionally, exposure to nature reduces psychophysiological stress and depression (American Public Health Association, 2013; Ulrich, 1983). A plethora of different variables of greenspace has been researched, examining the impact on mental wellbeing. Examples are the quantity and quality of greenspace (Francis et al., 2012; van den Berg, 2003; Wood et al. (2017), the proximity of greenspace (Houlden et al., 2019; Wood et al., 2017) and the number of visits to greenspace (Coldwell and Evans, 2018).

This research aims to address how visiting greenspace influenced people's perceived mental wellbeing during the Coronavirus outbreak. The WHO declared a global pandemic on March 11, 2020, leading national governments to take measures slowing the spread of COVID-19, often including mobility and social restrictions (Kleinschroth and Kowarik, 2020; WHO, 2020). In the Netherlands, an intelligent lockdown was announced urging people to remain at home (Ministerie van Algemene Zaken, 2020). The governmental measures have proven to increase stress and the degree of stress disorders, therefore decreasing the mental wellbeing of individuals (Duan and Zhu, 2020). Furthermore, Cullen et al. (2020) argue that people that already suffered from mental diseases might experience more severe symptoms, while individuals who did not have previous mental illnesses might develop them now. In a study by Grover et al. (2020), lockdowns and the overall pandemic caused 40 percent of the respondents to experience depression and anxiety. Furthermore, social distancing and isolation might introduce uncertainty, fear and feelings of anger, frustration and loneliness. Individuals might experience the feeling of being imprisoned as they are sometimes unable or not allowed to leave their homes. Research by Killgore et al. (2020) also found that physical distancing and fear of catching the virus might introduce depression and loneliness.

Several studies have investigated the influence of greenspace on mental wellbeing during the pandemic. Kleinschroth and Kowarik (2020) found that Google searches such as ‘*go for a walk*’ increased significantly after introducing limiting measures, showing the desire to go outside. This study also suggests that being in fresh air often improves wellbeing and that going outside is seen as an important and popular leisure activity. In the Netherlands, a surge in visiting greenspaces during the pandemic arose as forests and parks were filled with people who desired to go outside (NOS, 2020a; NOS, 2020b). Research by Lvinger et al. (2021) found that 82 percent of respondents considered greenspace as vital to their mental health during COVID-19. Research by Ugolini et al. (2020) found that greenspaces were considered as places of relaxation, exercise, solace and respite during complete lockdown and quarantine in the pandemic. When asked what people missed most about nature in a complete or strict lockdown, the most frequent answers were exercising outside, meeting other people, observing nature and breathing fresh air.

Additionally, both visiting greenspace and seeing greenspace from inside reduced anxiety, depression and loneliness (Soga et al, 2020). Another study found that spending time in gardens is associated with better emotional and mental health (Corley et al., 2021).

This research explores the following research question: *'How does visiting greenspace influence perceived mental wellbeing during the COVID-19 pandemic?'* For this, a case study was conducted on the inhabitants of the Province of Groningen, in which both rural and urban inhabitants are considered. To find an answer to this main research-question the following sub-questions have been formulated which have been based on literature discussed above.

- *What is the perceived impact of COVID-19 on interviewees' mental wellbeing?*
- *Does the COVID-19 pandemic cause a desire to visit greenspace (more often)?*
- *Is visiting greenspace perceived as influential on mental wellbeing?*
- *For what reasons were greenspaces visited during the pandemic?*

The following chapter explores existing literature about the topic and will present relevant concepts and theories to base this research on. The methods chapter will discuss how interviewees were selected and elaborates on semi-structured interviews. Afterwards, the results section discusses the gathered data in relation to existing literature. Lastly, the discussion and conclusion will follow, answering the research questions and providing future research recommendations. Furthermore, appendixes have been added, containing detailed figures, the interview sample and the coding tree.

2. Theoretical framework

2.1 Relevance

While some research has been conducted exploring the influence of greenspace on mental wellbeing during the COVID-19 outbreak, this topic has not been extensively researched yet. For example, no studies found have included the Netherlands specifically. Furthermore, the only study that has been found assessing the number of visits to greenspace during the pandemic mainly focused on the physical health of respondents (Ugolini et al., 2020). Additionally, rural areas, as opposed to urban areas, have been largely excluded from studies relating the use of greenspace to mental wellbeing in the COVID-19 pandemic. Therefore, this study focusses on mental wellbeing in relation to living area and visiting both urban and rural greenspace areas. Furthermore, qualitative research on this specific topic is missing in existing literature. Houlden et al. (2018) conducted a systematic review encompassing 52 papers examining the relationship between mental wellbeing and greenspace, from which they concluded that none of the literature examined the social contexts in which greenspaces are situated. The conducted interviews allowed participants to express personal experience and display a particular context (Punch, 2014). Thus this research aims to help fill the expressed research gap.

2.2 Definition of terms

It is important to define the terms referred to and used in this research, given a common understanding facilitates in discussing the topic overall. Therefore, a definition is provided for each relevant term, based on existing literature.

2.2.1 Mental wellbeing

Houlden et al. (2019) divide mental wellbeing into three categories: life satisfaction, worth and happiness. More specifically, Diener defines subjective wellbeing as: *'an umbrella term for the different valuations people make regarding their lives, the events happening to them, their bodies and minds, and the circumstances in which they live.'* (2006, pp. 400). This paper uses the definition of Diener (2006).

2.2.2 Greenspace

A literature review by Taylor and Hochuli (2017) examined the meaning of greenspaces across 125 journal articles. According to this review, greenspace can be interpreted in two different ways. Firstly, greenspace can be considered as nature or a natural area encompassing bodies of water, forests, parks, wilderness areas, farmland, street trees, gardens, backyards and food crops. The second interpretation of greenspace represents urban vegetation, encompassing parks, urban forests, urban farms and yards. Furthermore, research by Houlden et al. defines greenspace as: *' areas of grass, trees or other vegetation, and can be used to describe both surrounding greenness in the countryside, and spaces managed or reserved in urban environments'* (2018, pp.2). Given this research focuses on both rural and urban areas it combines these definitions to define greenspace as *areas of grass, trees, forests, parks, wilderness, farmland, bodies of water, gardens or backyards in both rural and urban areas.*

2.2.3 Urbanity and rurality

According to CBS, urbanity can be divided into five categories based on the 'omgevingsadressendichtheid' (CBS, n.d.):

- Urban: average of >2500 addresses per km²
- Highly urban: average of 1500-2500 addresses per km²
- Moderately urban: average of 1000-1500 addresses per km²
- Little urban: average of 500-1000 addresses per km²
- Non-urban: average of <500 addresses per km²

However, in the Netherlands, the threshold of 25.000 inhabitants is often considered urban (Telegraaf, 2014). Since Groningen is the only city in the Province of Groningen that has more than 25.000 inhabitants, it could be defined as the only city if the definition of the Telegraaf is applied. Figure 1 shows a GIS map of the 'omgevingsadressendichtheid', of which a more detailed version is provided in Appendix A (Figure 9). Subsequently, depending on the definition used, the places Appingedam, Delfzijl, Haren, Hoogezand, Leek, Stadskanaal, Veendam, Winschoten can be considered as either urban or rural, thus they are referred to as semi-urban in this research. Furthermore, all other places are considered rural as they have an 'omgevingsadressendichtheid' labelled 'little urban' or 'non-urban'.

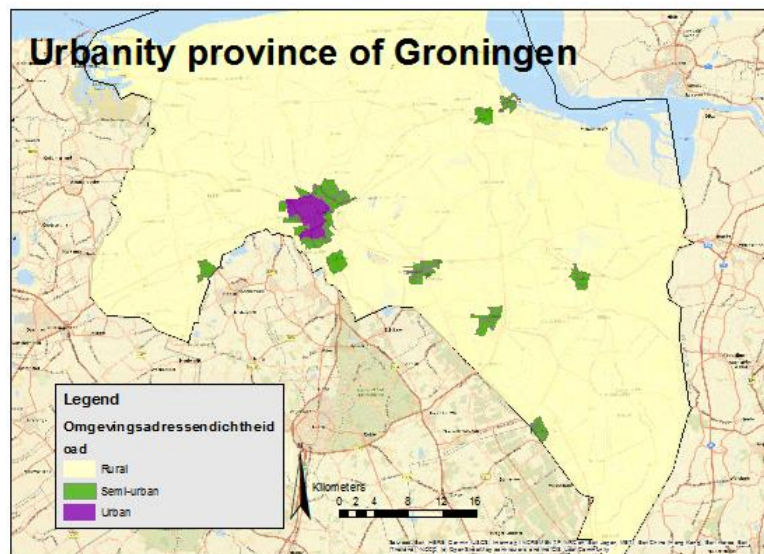


Figure 1. Map of the Urbanity of Groningen. Source: Author, 2021.

2.3 Conceptual model

This study investigates visitation to greenspace and its influence on perceived mental wellbeing during the COVID-19 pandemic. The conceptual model in Figure 2 shows the influence of COVID-19 on visiting greenspace and its effect on perceived mental wellbeing. Furthermore, the arrow going both ways shows the relationship between visiting greenspace and the perceived mental wellbeing, and the relation between the perceived mental wellbeing on visiting greenspace. The aim of this research is to investigate the relationship between visiting either urban or rural greenspace during the COVID-19 pandemic and the self-assessed mental wellbeing of individuals. This involves the processes behind the i) frequency of visits to and ii) the association between greenspace in COVID-19 and improved mental wellbeing as also found in research by Soga et al. (2020) and Corley et al. (2021). This provides an extra layer on the *how and why* to existing literature, as the focus lies on analysing the COVID period specifically, where new necessity to visit greenspace to improve mental health might be found (Levinger et al., 2021).

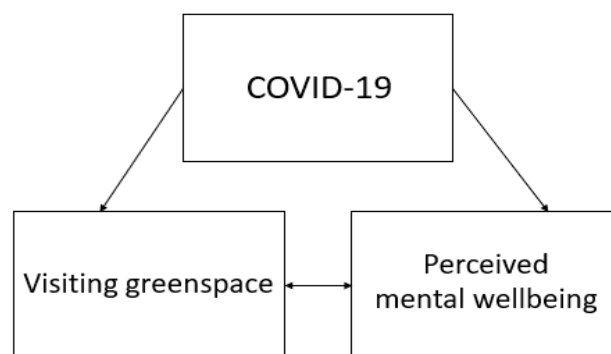


Figure 2. Conceptual model of the influence of visiting greenspace on perceived mental wellbeing; the influence of the COVID-19 pandemic on the perceived mental wellbeing; the influence of the perceived mental wellbeing on visiting greenspace and the influence of COVID-19 on visiting greenspace. Source: Author, 2021.

2.4 Expectations

It was expected that interviewees had visited greenspaces more frequently during the pandemic, that visitation positively influenced their mental wellbeing and that the desire to go outside was present (Kleinschroth and Kowarik, 2020). Additionally, it was expected that these interviewees visit greenspaces to exercise outside, meet other people, observe nature and breathe fresh air (Ugolini et al., 2020). Furthermore, based on research by Grover et al. (2020) interviewees were expected to have seen an increase in feelings of anger, frustration, anxiety, fear and loneliness because of restricting measures that governments have taken.

3. Methodology

3.1 Sample and setting

To find an answer to the research questions, nine semi-structured, in-depth and open-ended interviews were conducted elaborating on the individual context missing in existing literature. This gathered specific empirical data about the personal experiences of interviewees as it allowed them to display a particular context (Punch, 2014). Because semi-structured interviews are flexible, questions and the order of questions can be altered during the interview, helping the interview progress in a natural way (Fylan, 2005). The interviews aimed at exploring interviewees' interpretations and meanings of events in particular situations as they allow people to express the meaning they attach to certain things (Puch, 2014). Furthermore, the semi-structured approach limits emotional distress (Fylan, 2005), which is relevant given that a personal topic is discussed. It could be decided that questions about certain topics will not be answered if they are deemed too personal for the interviewee. Conducting these interviews gave more insights into the motivation and the context of people's behaviour, which helps in answering the research questions.

Fylan (2005) suggests having five broad questions in the interview schedule to track which research aspects the interview already covered. Apart from general personal information, five categories, based on the theoretical framework, have been developed:

- *Overall perceived mental wellbeing*
- *Impact of COVID-19 on the perceived mental wellbeing*
- *Desire to visit greenspace*
- *Visits to greenspace and its influence on perceived mental wellbeing*
- *Influence of having a garden*

At first, a pilot interview was conducted. When the real interviews took place, interviewees had to agree with an oral informed consent form in which they were asked for permission to record the interview for transcription. This informed consent is included in Appendix C. Six interviews were conducted using Skype, Microsoft Teams and Google meet, as this prevented interviewees risk or stress about their health in this pandemic. Furthermore, three interviews were conducted physically, since the interviewees preferred this. Here, all COVID-19 rules were adhered to and appropriate distancing was applied.

Table 1. and 2. (Appendix B) show the sample of interviewees with a short description of their characteristics, Figure 10 shows their geographical distribution. Since this research takes

inhabitants of the Province of Groningen as a case-study and aims to address visiting both rural and urban greenspace, a broad and diverse range of participants was selected to capture a varied sample of the inhabitants of Groningen. Choosing these interviewees was based on the level of rurality of their living area, their age and other factors such as accommodation type, marital status, gender, household composition and the work or school situation. The age group categories are based on research in the World Happiness Report (Helliwell et al., 2021) and the rurality is elaborated on in section 2.2.3 Acquaintances of people I know were asked to participate in an interview, preventing interviewing people in my direct surroundings, which would result in a more convenient sample than interviewing people I do not personally know. By ensuring that each age category and rurality category included interviewees both female and male, I managed to gather a varied group of interviewees. However, a greater sample could have been included covering a bigger variation in age and living environment, as this might have provided more insights and viewpoints.

Transcripts of the interviews were stored on a password-protected, private computer and were only used for the purpose of this research. The transcripts were anonymised and can therefore not be traced back to a particular person. The interviews were coded using the coding and analysis software *Atlas.ti*, which helped in structuring and organising data and identifying trends in the information (Clifford et al., 2016). The codes were derived from literature and the code list can be found in Appendix D. Afterwards, an analysis of these data was written where quotes were translated into English while focusing on translating the essence rightfully.

3.2 Study variables

3.2.1 Mental wellbeing

Questions about participants' perceived mental wellbeing and self-reported aspects of the quality of their life were also included, based on questionnaire questions from the UK Office for National Statistics (Office for National Statistics, 2018). Furthermore, interviewees were asked about how they perceived the impact of the COVID-19 pandemic on their mental wellbeing. They were asked if their daily lives have changed and how their behaviour and mental wellbeing changed because of this. Furthermore, they were asked if they think visiting greenspaces has had an impact on their mental wellbeing and if there are certain moments in which they feel more desire to visit greenspace. Lastly, they were asked if being in greenspace influenced their perceived mental wellbeing.

3.2.2 Greenspace

In the research by Coldwell and Evans (2018), respondents were asked how much built-up land and greenery was present around their residence to assess perceptions of their living environment. In the interviews, a question, therefore, was asked about interviewees' living area. Furthermore, questions about the different visited greenspaces and the proximity of these greenspaces were asked. Concludingly, respondents were asked to elaborate on the specific qualities appreciated about these greenspaces and about the activities they like to do in these areas.

3.2.3 Visits to greenspace

Matching research by Coldwell and Evans (2018), interviewees were asked how often and with what motivation they visited greenspace during the pandemic. Interviewees could explain which meanings they attach to greenspace and which aspects they perceived as influential on their mental wellbeing. Furthermore, as research by Cameron et al. (2012) found, having a garden might also count as greenspace that might influence wellbeing, questions regarding gardens and time spent there were also included. Interviewees were asked for a clear elaboration on their garden, its size, the amount of greenery and the activities they do in their garden. They were also asked in which situations they prefer visiting their garden instead of other greenspaces.

3.3 Analysis of the interviews

For the coding of the interviews, a coding list was made in *Atlas.ti*. First, codes were derived from literature based on aspects related to COVID-19 and greenspace, which was thus included in the code name. Then other codes were created, when specific other topics were mentioned. This allowed for a clear overview and enabled finding relations in the network analysis. For each sub-question a network analysis was made, linking relevant codes and statements of interviewees, which was then used to analyse the data to write the results.

4. Results

This section analyses the results of the interviews and links them to existing literature. The sub-questions to the research have been grouped into the impact of the pandemic on interviewees' mental wellbeing, the visitation of greenspaces during this time, the geographical dimension of visits, its influence on mental wellbeing and its purposes. First, a word-cloud, Figure 3, was created showing the frequency of words occurring in the interviews. However, it should be noted that the frequency includes both interviewees' statements but also the questions asked. The analysis will refer back to Figure 3 in mentioning the common themes.



Figure 3. Word-cloud visualising the frequency of topics in interviews. Source: Author, 2021.

4.1 Impact of COVID-19 on mental wellbeing

As mentioned in the introduction, the COVID-19 pandemic and its accompanying restrictions on individuals' mobility and social life have a significant impact on individuals. This section will investigate which impact the pandemic has had on interviewees' perceived mental wellbeing and will help answer the sub-question *what is the perceived impact of COVID-19 on interviewees' mental wellbeing?* First, as Cullen et al. (2020) indicate, people already suffering from mental diseases might experience more severe symptoms as is the case for interviewee 2.

*Interviewee 2: 'I also follow therapy ... And I think that as **I had more time to think about things [due to the pandemic], that helped [negatively]**'.*

Furthermore, new mental-illnesses might also be developed because of the restrictions and change in daily life caused by COVID-19 (Cullen et al., 2020). This occurred for interviewee 7.

*Interviewee 7: 'All of a sudden all the festivals were cancelled ... I always go on holiday abroad, was also cancelled ... So a lot of it just fell away ... I can't stand winter at all .. **and it was winter and dark and it just went on, and this was cancelled and that was cancelled ... So eventually that had an [mental] influence and I went to the doctor... so now I am on antidepressants**'.*

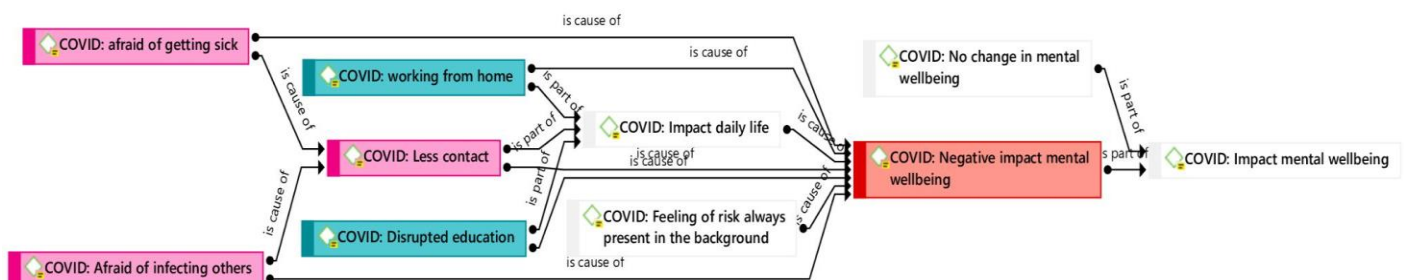


Figure 4. The impact of COVID-19 on mental wellbeing. Source: Author, 2021.

The flowchart in Figure 4, made by linking codes in *Atlas.ti*, displays specific factors impacting the mental wellbeing of interviewees during the pandemic. Interviewees indicated that the social restrictions influenced their mental-wellbeing, also displayed in Figure 3 as words such as *Friends, Social, Contact* and *People* were often mentioned. All interviewees mentioned that they decreased their face-to-face contacts in the pandemic and either do not visit others, or visit them less frequently as is also shown in pink in Figure 4.

Interviewee 9: 'The social contacts with people has gone to 5%'

*Interviewee 5: 'That **it is not so easy to meet up with your friends.. So I do see them less frequently** ... I do see my father at this moment, but in the beginning of the lockdown we did not visit him ... he is in a wheelchair so is partly dependent on care and assistance that we offer him ... So that was really bothering me. And my brother lives abroad so because of Corona we have not seen each other ... in the*

*beginning **my brother also called sometimes like if something happens to dad now, we cannot even go there ... Well, that idea does have an impact on you.***

*Interviewee 1: 'We get along well with the neighbours, **well I have not seen them for two months ... And that is very strange ... on Sunday, I was depressed about it.***

In line with research by Grover et al. (2020) the decrease in social contacts introduces emotions of sadness and fear. The fear of both infecting others and catching the virus themselves is, as stated by interviewees, as a reason to limit social interaction which is in line with research of Grover et al. (2020). This is indicated in pink in the flowchart.

Interviewee 7: 'Yes, scared for myself, but also scared for my parents.'

*Interviewee 5: 'And then you do have something in your mind like oh **I belong to a risk group so I have to be careful.** [Was that something always present in the background?] Yes.'*

However, others mentioned that they were not scared about getting sick themselves, while still feeling this caution towards infecting others. This partly was related to age, as all interviewees above the age of 60 indicated feeling a risk for themselves, while interviewees in the age group below 30 indicated only feeling afraid of infecting others. The middle age group varied, where one interviewee was afraid of infection as they belonged to a risk-group and was also afraid of infecting others. The other two interviewees in this age group were aware of the risk for themselves, but mainly focused on preventing infection of others.

*Interviewee 6: '**The risk that you infect your parents or grandfather or grandmother, knowing that they are not that strong anymore, well I do not take that risk.***

*Interviewee 4: 'That you think okay that [catching the virus] can also happen to me or my parents or grandma ... **that you think well I would survive that personally.***

Furthermore, as Figure 4 shows in blue, the impact of working and studying from home was a decreased amount of social interaction. Since youth are in a development phase with a heightened need for social contacts, this decrease might impact emotional development (Soer, 2021). Furthermore, working from home, overall, is associated with decreased mental wellbeing because of a change in work-station setup, the satisfaction with the workspace (Xiao et al., 2020). These factors are also indicated by the following interviewees.

*Interviewee 2: 'My motivation for school did drop a lot ... because **you stare at a screen the whole day and do not take up that much.***

Interviewee 3: 'I have not seen my classmates yet because I started my first year ... you should be doing school, but because you are not at school you don't do that as often ... I miss going out and that kind of stuff really badly. And I also miss meeting in groups.'

Interviewee 4: 'Yes of course that did have impact that you work from home instead of going to your office... You are working alone from home from your laptop. You don't have face-to face contact with your colleagues or clients anymore.'

Interviewee 6: 'I have to work from home ... well, then you are at your kitchen table and you try your best to make some sort of office, but it also is your kitchen ... so you do not have an idiotically big screen and your office chair ... Well, I have had a week where I wanted to fold my computer in half and throw it in the trash ... but not a constant depri feeling.'

According to Killgore et al. (2020), the decrease of social contact in COVID-19 sparks feelings of loneliness, which might lead to mental disorders such as depression. Two out of three interviewees that live alone also described feeling alone in their apartment and not enjoying that, however, both indicated that they would not name this loneliness.

Interviewee 4: 'Especially in the beginning ... it is even more emphasized that you live here alone. It was also hard in terms of social contact since you kind of are dependent on your household, housemates ... yes but I don't have that of course.'

Interviewee 7: 'And I really had the idea that I was sitting there alone in my apartment ... And that you [can go] nowhere, yes you can go to friends, but you have to go home eventually. That truly, I thought it was awful ... you are just alone, that just gets really unpleasant and very hopeless.'

4.2 Visits to greenspace during COVID-19

As stated in the introduction, the visitation of greenspace has increased during the COVID-19 pandemic (NOS, 2020a). This relates to the question of whether the pandemic increased the desire to visit greenspaces. Since the pandemic introduced a rise in working and studying from home (Khan et al., 2020; Xiao et al., 2020), more time is spent in homes, also indicated by the word *Home* in Figure 3. This came with increased desire and Google searches about going on walks during lockdown (Kleinschroth and Kowarik, 2020).

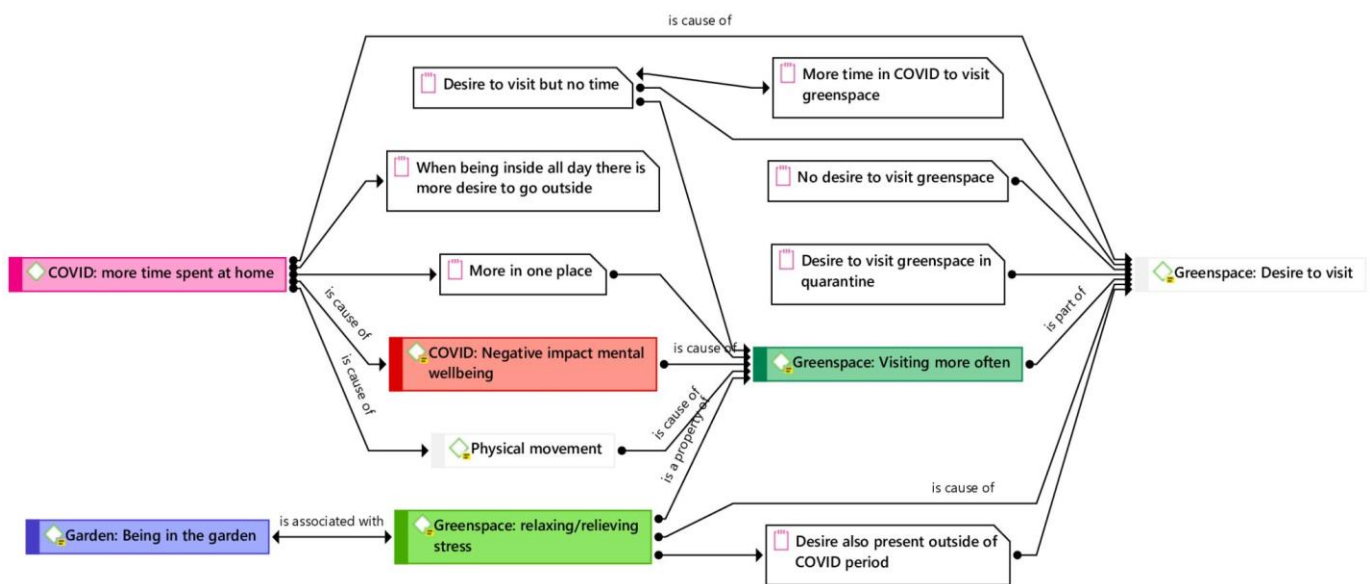


Figure 5. Desire to visit greenspace during the COVID-19 pandemic. Source: Author, 2021.

Topics relating to nature and greenspace have extensively been mentioned in the interviews, as is indicated by words such as *Outside*, *Nature* and *Garden* in Figure 3. The relations between COVID-19 and greenspace have been explored through networks and can be seen in Figure 5, of which a more detailed version can be found in Appendix E. Interviewees indicated an increased desire to visit greenspace and to go outside because they spent more time in their homes and experienced a decrease in visiting other places, as shown in pink in Figure 5.

Interviewee 5: 'There sometimes are weeks when I have not left [Place of residence], well eventually that brings a bit of a trapped feeling, while you were on the road a lot before because of work and you were doing all kinds of stuff ... Then I have the need to just look elsewhere, just to be away again, and to see something new.'

Interviewee 6: 'But now it was that you were home the whole week ... I am at home 7 days a week now instead of 2 ... Well I have kind of seen the kitchen now, I know every dent and crack. So there is also a need to go outside for a bit.'

Figure 5 shows that interviewees also stated that they naturally felt a desire to visit greenspace, whether in a pandemic or not, but that this desire increased during this period. Interviewee 8 already valued nature very highly and normally spent much time outside, however, because of the impact of COVID-19 on their daily life and routine they started visiting greenspace more often.

Interviewee 8: 'Especially the increase in sitting at one place. You actually are working at the place where you would normally watch series ... or sleep ... So you do everything at the same place currently ... travelling back and forth is missing ... So [now] everything kind of blends together ... I do recognize that I am frustrated with the fact that I am inside so much ... So I do go outside more.'

However, others state that spending time in their own garden, as indicated in blue in Figure 5, makes them not experience an increased desire to visit other greenspace compared to the pre-COVID situation, even though they do greatly value nature and greenspace. According to research by Corley et al. (2012), spending time in gardens improves emotional and mental health, especially in periods of home confinement.

*Interviewee 1: 'It is everything to me ... I can enjoy the smallest things. How everything grows and blooms ... Actually I normally only am inside in the evening ... **We have a really big garden ... the surface is the same as before the corona period so we have our hands full from that. So we do not have a reason to visit nature more often.'***

Corley et al. (2021) found that using the garden was especially relevant for elderly as it might serve as a mental activity and outlet to reduce mental harm experienced because of periods of home confinement. As Interviewee 1 is elderly, the previous quote shows that visiting their garden is essential for his health. The importance of having a garden was mentioned by other, non-elderly interviewees as well, thus it might not be related to age. Furthermore, interviewees mentioned having their own outdoor space, was a requirement in buying their house. Interviewees living in Groningen mentioned a balcony as no interviewees had their own garden, while interviewees from semi-urban and rural areas all mentioned having and appreciating their own garden. Interviewee 4, for example, recently bought a new residence and stated that an own outdoor space was required.

*Interviewee 4: 'So that you can sit there [on the balcony] is a nice addition ... It was something I really wanted, a balcony. **Yes, it really was a requirement. I actually would not buy a residence without any outdoor space.'***

Other interviewees, mainly living in the rural and semi-urban areas, mention the increasing importance and appreciation of their garden and green living environment in the COVID-19 pandemic. They state feeling for the people living in apartments in the city, as they do not have the same amount of greenery and living space surrounding them, which the interviewees perceive as hard during the pandemic.

*Interviewee 5: 'If the weather is nice we always are in the garden ... We also were so happy about it [the garden] in the first lockdown ... that you could be outside ... then the message really was stay home. **And you saw many people in an apartment not being able to go anywhere. Well, then I thought at least we can go outside and play outside [with the children]. Then we still are at home, but we are outside. That made a big difference. [Do you appreciate that more now?] Yes, I think so ... That you have a house with a garden and indeed that you live in such a living environment.'***

*Interviewee 1: **I say that a lot to my wife in the corona period, it is amazing that we live here. Because we do not have limitations. No, we can just walk here freely ... Yesterday on the television there was a man that lived on the sixth floor ... In a flat. Well, I would go insane. I cannot imagine how to fill your life then. We are completely focused on space, we go outside.***

However, not every interviewee felt the desire to visit greenspace either before or during the pandemic.

*Interviewee 7: **'I never see the beauty of nature. Yes, the fresh green ... [What value would you attach to greenspace?] Well, not that much ... I also have colleagues that say 'oh I have to visit outside today, but I do not have that at all.'***

4.3 Geographical dimension of visits to greenspace

It is also important to analyse the geographical dimensions of visits to greenspace. Most interviewees mention visiting greenspace in close proximity to their residence most often. Research has shown that increased distance decreases the frequency of use (Jones, Hillsdon and Coombes, 2009), and that proximity to greenspace is associated with mental wellbeing (Houlden et al., 2019; Wood et al., 2017). Interviewee 4 states the following:

*Interviewee 4: **'Well, I live close to the Noorderplantsoen, so that of course is a place where it is nice to walk ... as a piece of your walk.'***

Many interviewees also mention appreciating and visiting a wide range of greenspaces. The province of Drenthe was specifically mentioned by 5 out of 9 interviewees as a place that is especially appreciated. While some interviewees already visited Drenthe often before the pandemic, others state that they increasingly started visiting Drenthe in the pandemic. This was because they had more time for this, or as it was seen as a new environment when there was an increased desire to visit new places as other activities were limited.

*Interviewee 3: **'And most of the time I choose a route that also goes through woods ... in the Province of Groningen, and Drenthe once in a while ... [Did you also visit those places a bit further away before corona?] Not that often to Drenthe, that was a bit far, I did not really have time for that.'***

*Interviewee 5: **'So we have started to search more actively of what else there is. So you do visit places where you normally [before COVID] would not have visited that easily, because then you have way more options of things to do. So yes you do see new things ... We search in Groningen, Drenthe and Friesland.'***

Furthermore, it is interesting to note that urban and semi-urban residents indicate that they also visit rural greenspace for relaxation and a change of scenery, while rural residents do not indicate visiting urban or semi-urban greenspace. Interviewees living in Groningen mention visiting parks in the city, like the Noorderplantsoen, as they resemble a different environment in the city. However, they also mention having the desire to visit greenspace outside of the city.

Interviewee 4: 'Mainly the Noorderplantsoen, or other parks that you have in Groningen ... , where you can walk through or sit still for a moment. So yes it is nice that it is really different from the city, which can be quite hectic with cars etcetera ... And if you go a bit further then you quickly are in between the meadows ... so it is nice to just walk outside of the city ... Also because you already walk a lot in your own area ... And then it is also nice to sometimes visit an area that you do not necessarily know well.'

Interviewee 8: I like to really go into the meadows on my bike ... Biking to Lauwersoog or something similar... But if I walk, I live close to the Noorderplantsoen, so then I walk there, or in the Stadspark and go for a run or something. So parks in the city are not necessarily less than actual nature or non-planned nature in my opinion, but it often is a bit more busy, and the quietness is also important to me.'

Here interviewee 8 indicates they differentiate between planned and non-planned greenspace and nature. This was also mentioned by two other interviewees, that also consider there to be a difference, that they attach different values and states of mental-wellbeing to. Interviewee 6 mentions feeling more peaceful where nature grows more unstructured, as it reminds them mother nature is doing her thing.

4.4 The influence of visiting greenspace on mental-wellbeing

The next question is whether visiting greenspace is perceived as influential on mental wellbeing. This relation is analysed in Figure 6, of which a more elaborate version can be found in Appendix E.

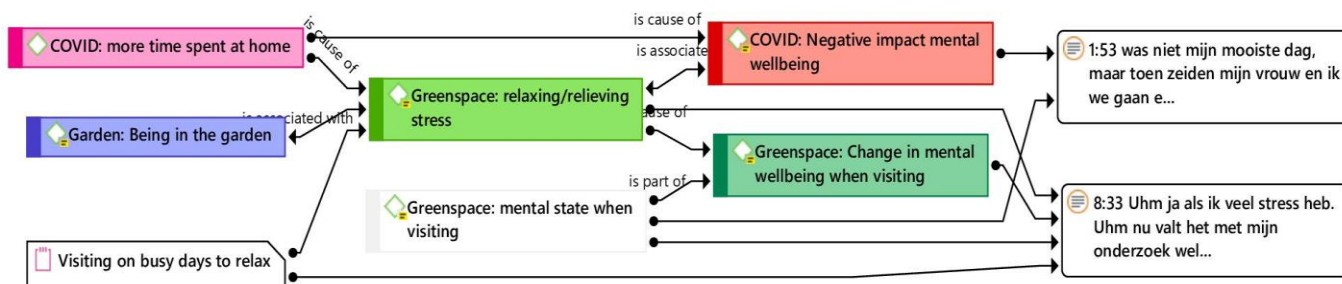


Figure 6. The influence of visiting greenspace on mental wellbeing. Source: Author, 2021.

Research by Ugolini et al. (2020) indicates that when people cannot visit nature, they miss going outside, observing nature, breathing fresh air and the idea of spending time in greenspace. The effect of greenspace on wellbeing that was mentioned most often during interviews, was that being in greenspace facilitated relaxing and relieving stress. This is also indicated by the words *Peace* and *Silence* in Figure 3 and the lime-green box in Figure 6. This is in line with research stating that exposure to nature, in general, reduces psychophysiological stress and depression and that in the pandemic visiting (urban) greenspaces offers destressing and relaxation (American Public Health Association, 2013; Soer, 2021).

Interviewee 6: 'And then there is no car or aeroplane, but you do hear the birds and the wind blowing, so that is very relaxing for me.'

*Interviewee 3: 'I am quite a busy person and always doing something and I sometimes find that difficult and **when I go to those [green] places that is precisely what makes me think oh this is chill.**'*

*Interviewee 5: 'You do recognize that the fact that you have so much green surrounding you when you look outside that it just influences how you feel ... **it gives a particular peacefulness and relaxation ... also some kind of freedom that you have green surrounding you,** looking outside, that you can visit those places. Yes, I really appreciate that.'*

The question remaining is whether greenspaces are visited during specific mental states and whether this is perceived as being influential on mental wellbeing in those situations. The following quotes indicate in which emotional states greenspaces are visited and how visits influence the mental wellbeing of interviewees by providing relaxation, as is also shown in dark green in Figure 6.

*Interviewee 8: '**Well, when I am very stressed ... in exam periods I go outside. Then I like to take a walk to relax between studying to reduce the stress a bit.**'*

*Interviewee 3: 'Mostly after I have studied a lot and especially in exam periods, then I think oh now I really have to go outside, now I have spent too much time behind my computer. And yes, **for example when there has been a fight at home, then I also think like now I am going outside you know. So yes I think especially when you are a bit full and frustrated ... then it is most pleasant to go outside.**'*

4.5 Purposes of greenspace visitation in COVID-19

Since the pandemic drastically changed daily lives and individuals are more homebound, it is interesting to investigate whether greenspaces are used for different purposes than before. As the network analysis in Figure 7 indicates in pink, interviewees indicate that they now visit greenspace for a change in scenery, since working and studying from home introduces spending more time inside their house, which is in line with research of Khan et al. (2020) and Xiao et al. (2020).

Interviewee 3: 'Yes, especially in the corona period, I walk a lot.'

*Interviewee 5: '[Does it influence you?] Yes, a positive one ... **to take a break in a completely different green environment that gives a lot of relaxation.** After a busy week or something, well of course you already work at home, I do have the need to go away for a while and go to something like that.'*

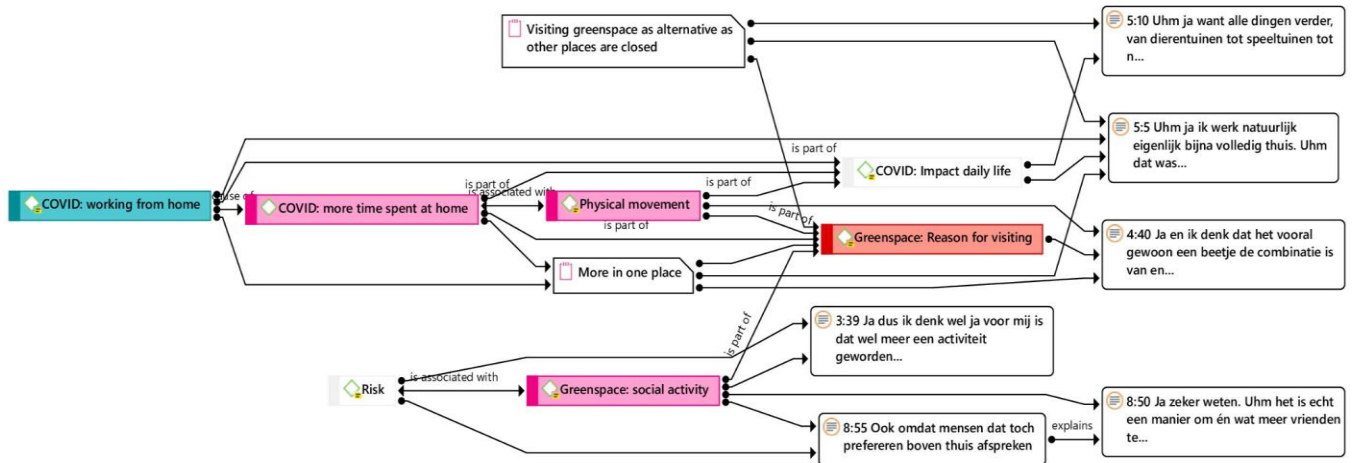


Figure 7. The reasons for visiting greenspace during the COVID-19 pandemic. Source: Author, 2021.

Interviewees also mentioned that they increased their physically active visits to greenspace during this period as alternatives have been closed down, as indicated in pink in Figure 7. This is in line with research by Ugolini et al. (2020) and the following interviewee indicates that exercising outside has a positive influence on mental wellbeing as well as it gives relaxation and works recharging.

*Interviewee 4: ‘[Did you walk or cycle more in this period?] **It has always been like that, only to a greater extent in the corona period ... you didn’t have so many alternatives so normally I went to work out in the gym ... so then you are looking for a bit of an alternative ... I think it is nice to go outside sometimes just to see a different environment and it is also good for your health to have some movement ... Because you literally went outside for a bit then you do get a fulfilled feeling that you have seen something else and have been active’***

Furthermore, COVID-restrictions on visiting greenspaces with groups, harms mental wellbeing, since greenspace is often used as a meeting place (Burnett et al., 2021). In the Netherlands, meeting in groups was prohibited in March 2020, however, during the pandemic rules of outside gatherings have become more lenient (Ministerie van Algemene Zaken, 2020). Greenspaces have thus also gained the use of social meeting places and interviewees indicate that they make use of this given they feel like there is less risk of infection meeting people outside, as is shown in Figure 7.

*Interviewee 3: ‘**I think it [walking outside] has become more of an activity for me in the corona period, just to meet people again. Then you go for a walk more easily, because then you are not inside and the risk is a bit lower.’***

*Interviewee 4: ‘**It indeed got more of a social function ... it actually is a way to be able to see your colleagues face-to-face for a change, in a safe way of course ... and yes you do meet with friends to take a walk ... that happens more in the corona period than before.’***

5. Discussion

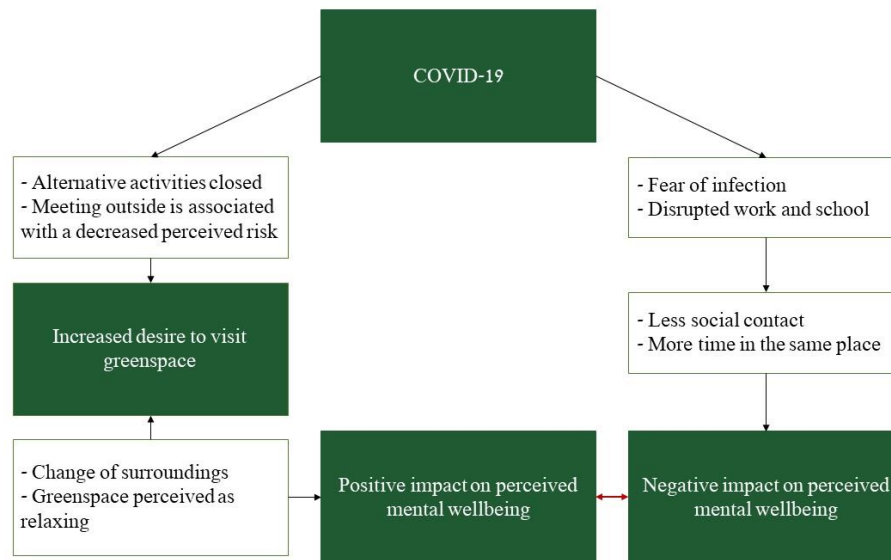


Figure 8. Overview of the relation between COVID-19, mental wellbeing and the desire to visit greenspace. Source: Author, 2021.

This research aims to investigate the relationship between visiting either urban or rural greenspace during the COVID-19 pandemic and the self-assessed mental wellbeing of individuals. The first question is what the perceived impact of COVID-19 is on individuals' mental wellbeing. The findings suggest that the pandemic negatively impacts mental wellbeing as is also found in literature of Cullen et al. (2020). Figure 8 shows an overview of the relation between COVID-19, mental wellbeing and the desire to visit greenspace. As can be seen in the results section, restrictive measures altered daily lives and the decrease in social contacts was especially deteriorating mental wellbeing, as was also found by Duan and Zhu (2020). In line with research by Grover et al. (2020), fears of infecting others or getting infected were present. Furthermore, working and following education from home causes individuals to spend more time behind their computer in their residence which introduces a lack in change of scenery increasingly causing visits to greenspace. This addresses the second question, whether the pandemic causes a desire to visit greenspace more often. Eight out of nine interviewees valued nature highly and indicated a desire to increasingly visit greenspace in the pandemic as it provided a calm space. However, one interviewee mentioned that they did not enjoy visiting greenspace regardless of the pandemic. Additionally, some interviewees also indicate that spending time in their garden has caused no extra desire to visit other greenspace. Furthermore, interviewees mention that having their own outdoor space was a requirement in selecting their residence. Rural and semi-urban residents indicate feeling new appreciation for greenspace, and having their own outdoor space during this pandemic, as they feel for people living without this.

Interviewees mentioned visiting proximate greenspace most often, but an increase in visiting greenspace they have not been to before has also arisen during the pandemic. Interviewees indicate that they have more time for this, and more desire to do this as alternative

activities have closed and as a change in their environment. Five out of nine interviewees indicate appreciating visits to greenspace in Drenthe, thus apart from visiting greenspace in Groningen, Drenthe has also increasingly been visited. Residents of the city of Groningen mainly visit parks in the city but also indicate feeling a desire to visit greenspace in rural areas as this is seen as a break from the city, thus introducing relaxation. This helps answering the third sub-question of whether visiting greenspace is perceived as influential on interviewees' mental wellbeing. The findings of this research confirm research by Houlden et al. (2019), that states a positive association between greenspace and mental wellbeing. Interviewees mention visiting greenspaces in situations when their mental wellbeing is not optimal, as greenspace helps them relieve stress and relax. This is in line with research by Ugolini et al. (2020) stating that greenspaces are considered as places for relaxation, exercise, solace and respite during the corona period, which partly answers the last sub-question about the reasons for which greenspaces were visited during COVID.

Apart from visiting greenspace for relaxation in the timeframe of the COVID-19 pandemic greenspaces were visited as social activity more than before. This is related to the fact that the perceived risk of COVID-infections is lower outside. This social contact helps alleviate some mental distress caused by the decrease of social contacts that was found in research by Killgore et al. (2020). Furthermore, greenspace was also visited, increasingly, as a way of having physical exercise as alternatives were closed. These findings provide a context in the relationship between mental wellbeing and greenspace that is missing in previous literature (Houlden et al, 2018). Furthermore, it specifically highlights this relationship within the COVID-19 pandemic.

It should be noted that these results are derived from a case study on the Province of Groningen. By including a broad scope of interviewees this research aimed to capture a wide variation of inhabitants, of which eight indicated that they regularly visit and desire to visit greenspace. However, this can also be regarded as a weakness as individuals who do not perceive greenspace as being influential on their mental wellbeing are underrepresented, leaving that aspect of the topic underdeveloped. Furthermore, as the interviews were conducted in a short time span, the same social and mobility restrictions imposed by the government were in place, meaning that individuals had to adhere to the same rules. This prevented variation in answers about how these rules impacted daily lives. While at the same time, it leaves further questions about how imposed rules over time impacted individuals' mental wellbeing and their desire to visit greenspace. Further research could thus investigate the impact of specific restrictions over time on individuals' mental wellbeing and the greenspace visitations. As this research contains focus on visitation of both urban and rural greenspaces, it adds to existing data, given previous research mainly focuses on urban greenspace. As existing literature on the relationship between visits to rural greenspace during the COVID-19 pandemic is confined, this limited comparing results to existing literature. Therefore, this research might be regarded as an addition to the research puzzle, however, more research on this specific topic is necessary. Accordingly, further quantitative research on mental wellbeing and visiting both urban and rural greenspace would also add to the qualitative results gathered in this research. Such a quantitative study would be able to make more general statements as it is more representative of a population, where it can be conducted on a national scale. A quantitative research also allows controlling for factors such as age, gender, ethnicity, accommodation type and the proximity to greenspace, that also

influence visiting greenspace and mental wellbeing (Cameron et al., 2012; Evans, Wells and Moch, 2003; Lewis et al., 2017; Niemeyer et al., 2019; Schipperijn et al., 2010; Wood et al., 2017).

6. Conclusion

To conclude, this research analysed the processes behind i) the frequency of visits to and ii) the association between greenspace in COVID-19 and improved mental wellbeing as also found in research by Soga et al. (2020) and Corley et al. (2021). The findings suggest that the pandemic negatively impacts mental wellbeing, due to spending more time in one place, a decrease in social contacts, and a fear of infections. The majority of interviewees mention that they visit greenspaces more frequently during the pandemic, and that they increasingly visit greenspaces they did not visit before. Others state that the frequency remained the same as they already spent a considerable amount of time outside or in their garden. Furthermore, one interviewee mentioned not enjoying visiting greenspace either before or during the pandemic. Residents of urban areas indicate visiting parks within the city of Groningen, and additionally, also appreciating visiting greenspace in semi-urban and rural areas. However, interviewees from rural areas do not indicate visiting greenspace in urban areas and even mention increasingly feeling for people living in apartments and cities during the pandemic as there is less greenspace. They express a new increased appreciation for their green living environment during COVID-19. Furthermore, the interviewees that visit greenspace regularly, indicate that these visitations are associated with improved mental wellbeing and that they visit to destress, have a change of scenery and to have social contacts as meeting outside is associated with a perceived lower risk of infection. The nine interviews have thus provided contextual information regarding the link between greenspace and mental wellbeing, which was found lacking by Houlden et al (2018).

Since mental health-related diseases are worldwide regarded as a leading cause of disability and preventative measures to increase mental wellbeing are promoted (WHO, 2013), this research highlights the importance of greenspace for mental wellbeing, in and before the COVID-19 pandemic. Therefore, indicating the importance of greenspaces in spatial planning practices. Further, it shows that prevention of the closing of public greenspaces during the pandemic is important. The interviews conducted in this research highlights the necessity of seeing and visiting greenspaces for individuals' mental wellbeing.

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7. Appendices

Appendix A - GIS map of urbanity of the Province of Groningen

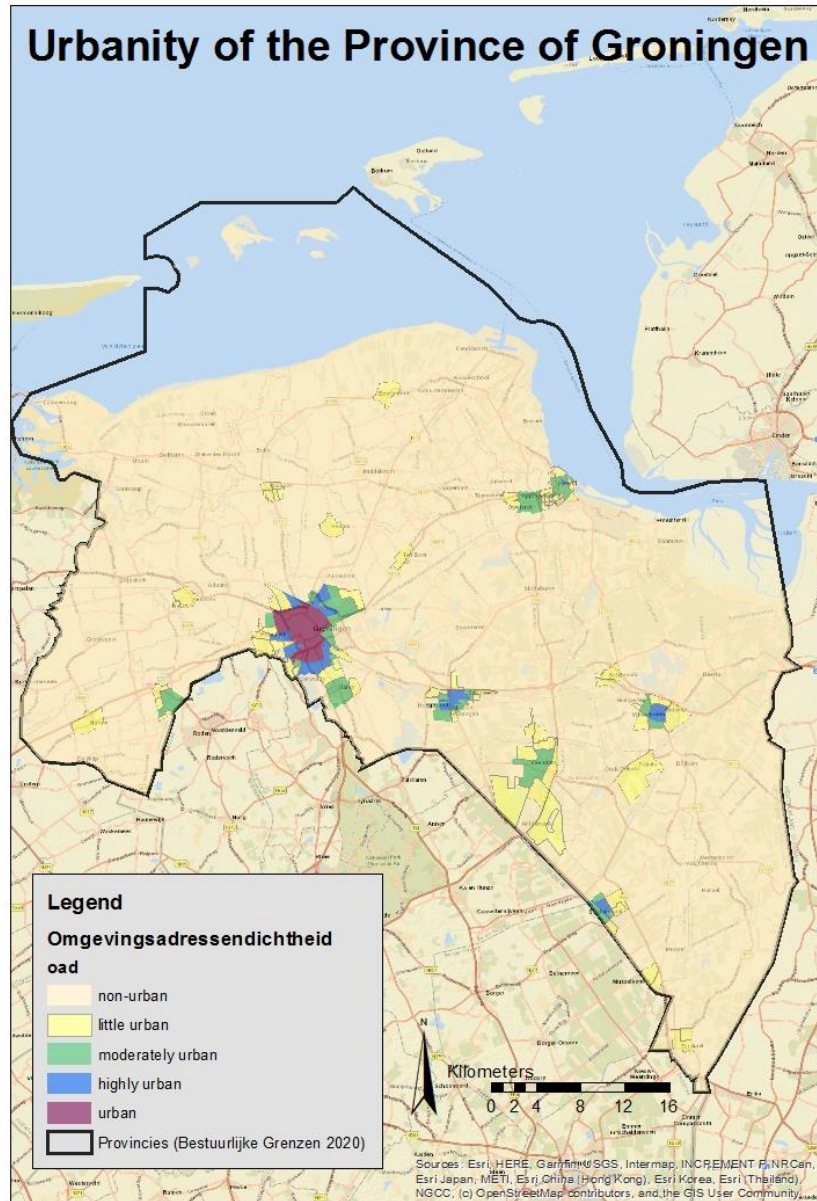


Figure 9. Detailed map of the Urbanity of the Province of Groningen. Source: Author, 2021.

Appendix B - Sample of interviewees

Table 1. The interview sample.

Age group	Urban (Groningen)	Highly/Moderately urban	Little/Non-urban	Total
<30	1	1	1	3
30-59	1	1	1	3
>60	1	1	1	3
Total	3	3	3	9



Figure 10. Map of the places of residence of the sample. Source: Author, 2021.

Appendix C – Informed consent form

Dutch:

Hallo welkom bij dit interview. Mijn naam is Julia Brink en ik wil je alvast bedanken voor het meewerken aan dit interview. In dit interview zou ik graag willen uitvinden of het bezoeken van groene plekken gedurende de corona periode invloed heeft op het mentale welzijn. Het interview zal gebruikt worden in mijn scriptie. Ik zal nu de weloverwogen toestemming, ook wel informed consent, voorlezen en na elk stuk kan je aangeven of je instemt. Het is ook mogelijk om tussentijds vragen te stellen over deze weloverwogen toestemming.

Weloverwogen toestemming/Informed consent

Ik verklaar op een voor mij duidelijke wijze te zijn ingelicht over de aard, methode en het doel van het onderzoek. Ik weet dat de gegevens en resultaten van het onderzoek worden geanonimiseerd en alleen vertrouwelijk aan de beschreven onderwijsinstelling (Rijksuniversiteit Groningen) bekend gemaakt zullen worden. Mijn vragen zijn naar tevredenheid beantwoord.

Ik begrijp dat eventueel opnamemateriaal of bewerking daarvan uitsluitend voor analyse en/of wetenschappelijke presentaties kan worden gebruikt.

Ik stem geheel vrijwillig in met deelname aan dit onderzoek.

Al mijn vragen omtrent deelname aan dit onderzoek zijn beantwoord.

English:

Hello, welcome to this interview. My name is Julia Brink and I would like to thank you in advance for willing to participate in this interview. In this interview I would like to analyse if visiting greenspace during the COVID-19 period had an influence on your mental wellbeing. The interview will be used for my bachelor thesis. I will now read the informed consent to you and after each statement you can indicate whether you agree or not. It is also possible to ask questions about this informed consent.

Informed consent

I declare that I have been clearly informed about the nature, method and purpose of this research. I know that the data and results of the research are made anonymous and will only be disclosed confidentially to the described educational institution (University of Groningen).

I understand that any recording material or editing of such can only be used for analysis and/or scientific presentations.

I agree voluntarily to participate in this study.

All my questions about participating in this research are answered.

Appendix D - List of codes

Table 3. The codes created in Atlas.ti.

Code	Code Groups
Accommodation type	Interview characteristics
Activity: Biking	Greenspace Activities in greenspace
Activity: Driving	Activities in greenspace
Activity: Gardening	Activities in greenspace
Activity: Playing	Activities in greenspace
Activity: Walking	Activities in greenspace
Age	Interview characteristics
Appreciation of greenspace in pandemic	Greenspace
Balcony	Garden
COVID: afraid of getting sick	Impact COVID on mental wellbeing
COVID: Afraid of infecting others	Impact COVID on mental wellbeing
COVID: Change over time	Impact COVID on mental wellbeing
COVID: Disrupted education	Impact COVID on mental wellbeing Impact daily life of COVID
COVID: Feeling of risk always present in the background	Impact COVID on mental wellbeing
COVID: Impact daily life	Impact COVID on mental wellbeing Impact daily life of COVID
COVID: Impact mental wellbeing	Impact COVID on mental wellbeing
COVID: Less contact	Impact COVID on mental wellbeing Impact daily life of COVID
COVID: More contact	Impact daily life of COVID
COVID: More time spent at home	Impact daily life of COVID
COVID: Negative impact mental wellbeing	Impact COVID on mental wellbeing
COVID: No change in daily life	Impact COVID on mental wellbeing Impact daily life of COVID
COVID: No change in mental wellbeing	Impact COVID on mental wellbeing
COVID: No stress	Impact COVID on mental wellbeing
COVID: Not afraid of getting sick themselves	Impact COVID on mental wellbeing
COVID: uncertainty	Impact COVID on mental wellbeing Impact daily life of COVID
COVID: working from home	Impact daily life of COVID
Feeling of being privileged during pandemic	Impact COVID on mental wellbeing
Garden: Being in the garden	Garden

Greenspace: No change in meaning in COVID	Greenspace
Greenspace :Meaning	Greenspace
Greenspace they do particularly like	Greenspace
Greenspace they don't particularly like	Greenspace
Greenspace: Animals	Greenspace
Greenspace: Change in mental wellbeing when visiting	Impact COVID on mental wellbeing
Greenspace: Description	Greenspace
Greenspace: Desire to visit	Greenspace
Greenspace: Farmland	Greenspace
Greenspace: Forest	Greenspace
Greenspace: Frequency	Greenspace
Greenspace: frequency of visits not changed	Greenspace
Greenspace: location	Greenspace
Greenspace: mental state when visiting	Influence greenspace on mental wellbeing
Greenspace: Reason for visiting	Greenspace
Greenspace: relaxing/relieving stress	Influence greenspace on mental wellbeing
Greenspace: social activity	Greenspace
Greenspace: Visiting less often	Greenspace
Greenspace: Visiting more often	Greenspace
Greenspace: Visiting new greenspace	Greenspace
Greenspace: water	Greenspace
Life satisfaction	Overall mental wellbeing
living situation	Interview characteristics
Neg. position towards built up area	City/built up environment
Neg. position towards living in flat	City/built up environment
Overall mental wellbeing	Overall mental wellbeing
Own outdoor space	Garden
Physical movement	
Place of residence	Interview characteristics
Pos. position towards build up area	City/built up environment
Reason for not visiting greenspace more often	Greenspace
Reason for this residence	Interview characteristics
Risk	Impact COVID on mental wellbeing
Self-description	Interview characteristics
Social change	Impact COVID on mental wellbeing
Surroundings of residence	Interview characteristics
Visits to greenspace	Greenspace

Weather and seasons	Impact COVID on mental wellbeing Greenspace
Working more	

Appendix E - Flow charts from Atlas.ti

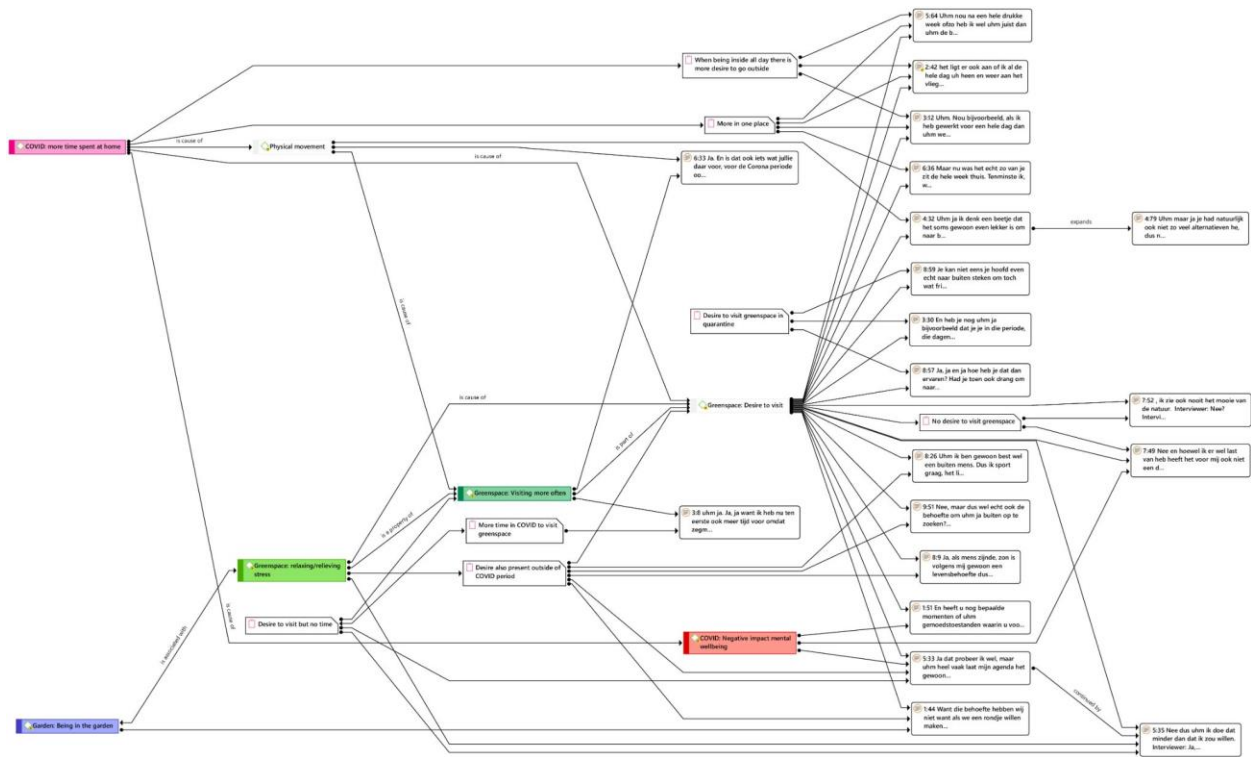


Figure 11. Elaborate flowchart on the desire to visit greenspace during the COVID-19 pandemic. Source: Author, 2021.

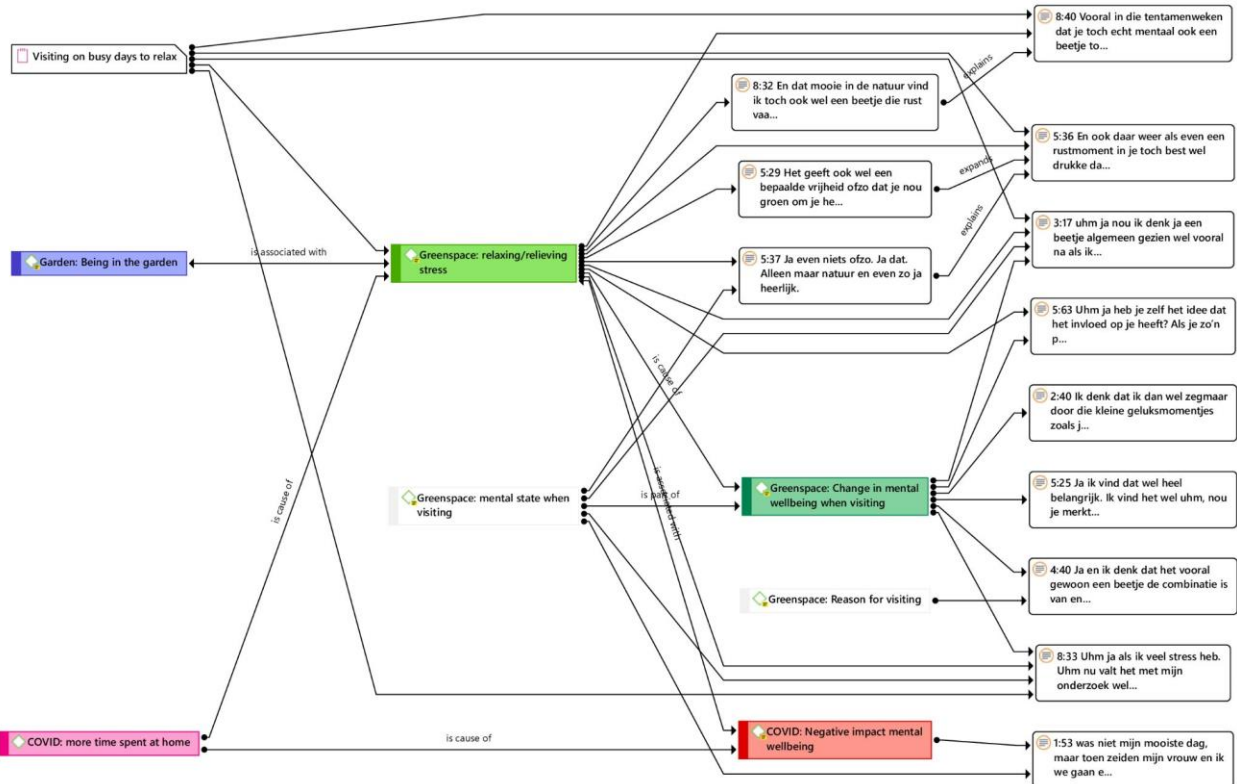


Figure 12. Elaborate flowchart on the influence of greenspace on the mental wellbeing. Source: Author, 2021.

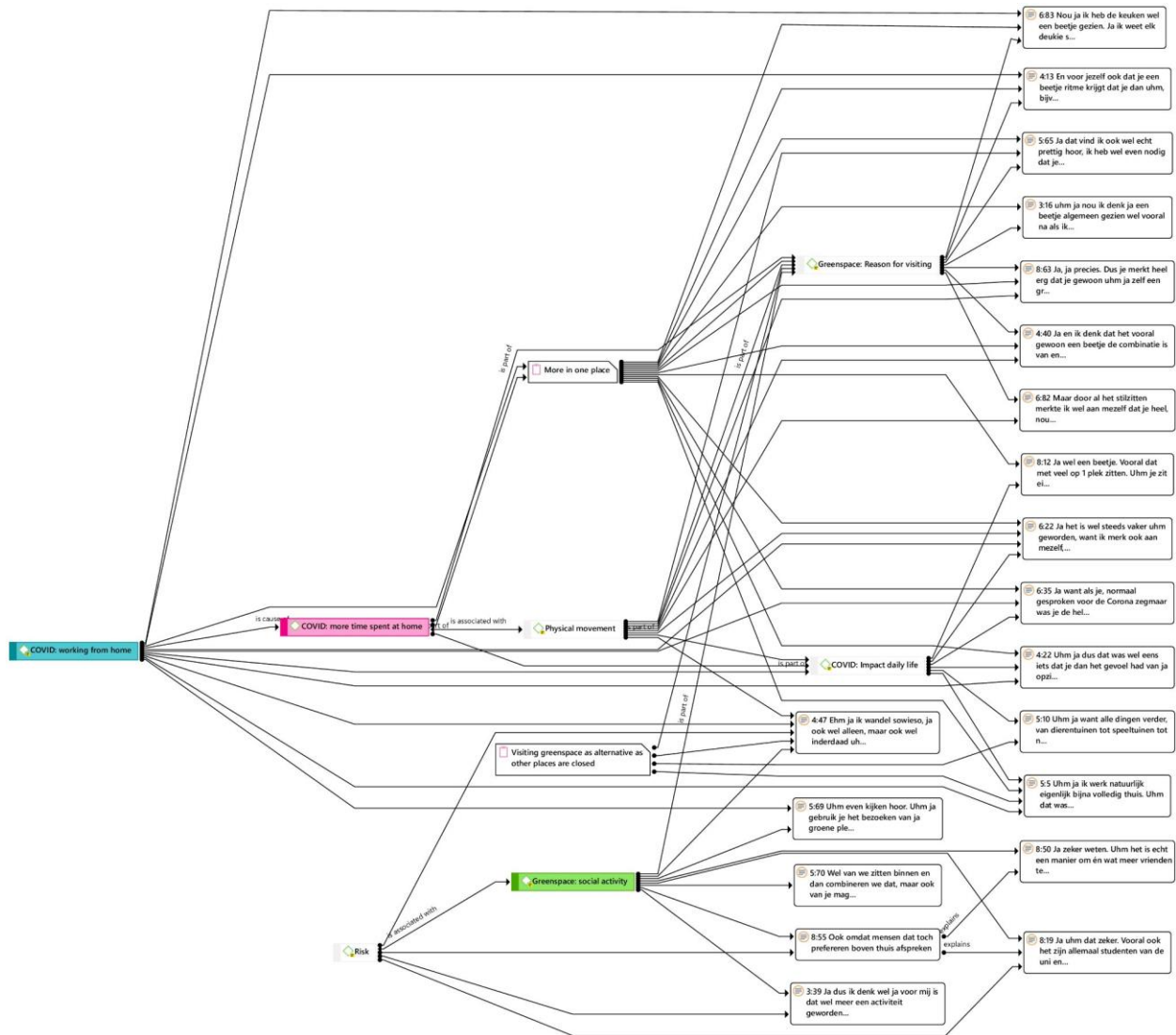


Figure 13. Elaborate flowchart on the reasons for visiting greenspace. Source: Author, 2021.