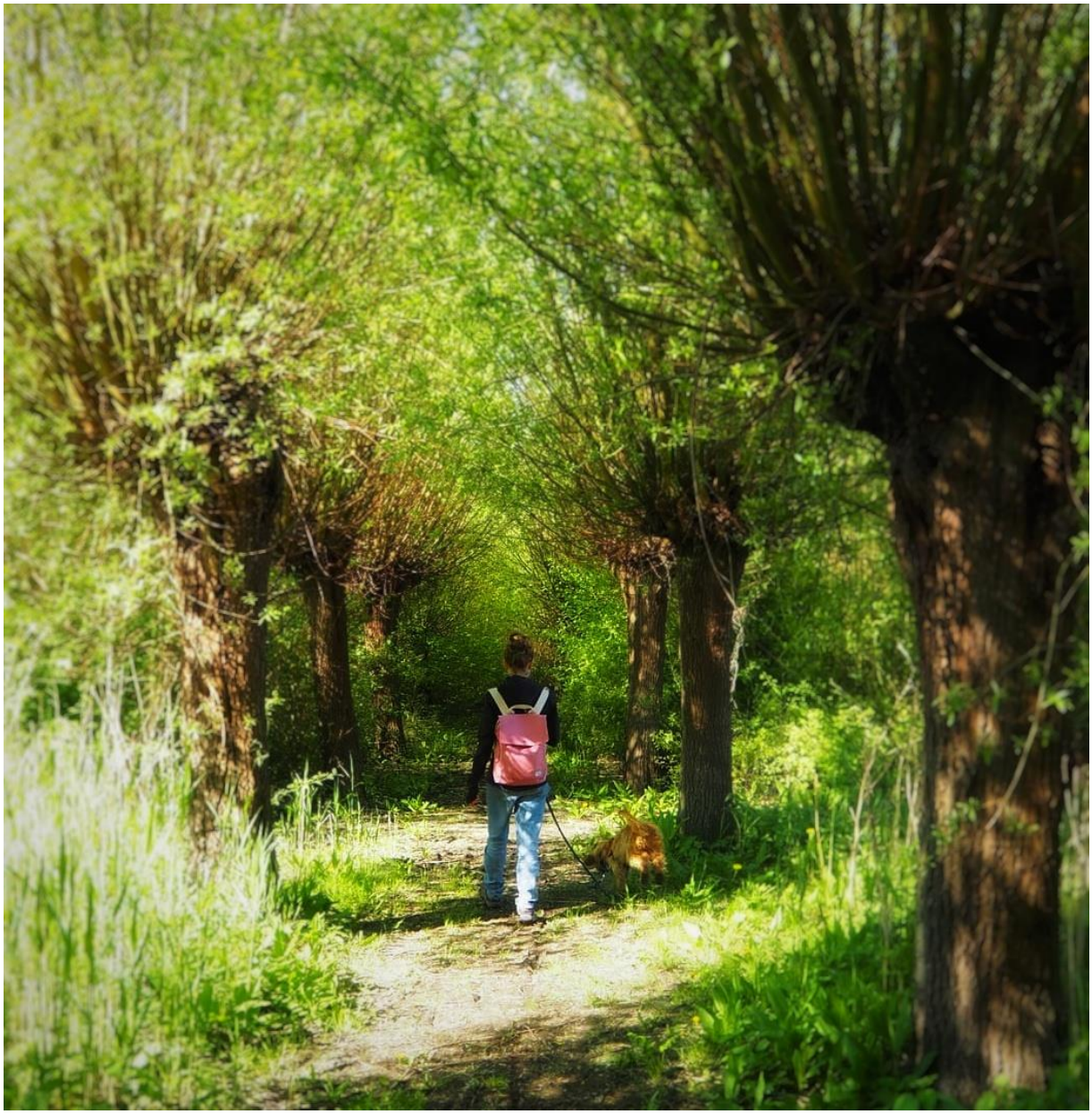
Climate Change Risk Perceptions and Nature Visits

A cross-sectional study on the association between climate change risk perceptions, nature visits and its determinants



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A cross-sectional study on the association between climate change risk perceptions, nature visits and its determinants

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Abstract

Background Mental health issues are an increasing problem worldwide. One of the main causes of mental health disorders is stress. From the salutogenic perspective, restoration of resources can help dealing with daily-life stressors. Nature is one of the places with such a restorative ability. Visiting nature can therefore be essential in maintaining mental-wellbeing. But what if visiting nature is constrained by risk perceptions regarding extreme weather conditions? This thesis examines people's nature visits and if these are influenced by the impacts of climate change. The effect of climate change consequences on mental well-being through nature visits is an underdeveloped area. The aim of this thesis is to explain nature visits with the help of the determinants of those nature visits and climate change risk perceptions (CCRP). As a base for the conceptual model developed in this thesis, Social cognitive theory (SCT) is used. The behaviour is adjusted to nature visits and a CCRP determinant is added. it is hypothesized that CCRP has a negative influence on self-efficacy, mainly through the affection determinant (H1). Secondly, it is hypothesized that high climate change risk perceptions lead to more negative outcome expectations (H2). Lastly, more broadly it is hypothesized that climate change risk perceptions thus indirectly negatively influence the actual nature visits (H3).

Methodology Results are gathered through a cross-sectional study among Dutch people that visit nature at least once a week. A total of 129 completed online surveys were used for statistical analysis in SPSS.

Results The results show that the sample has an overall positive attitude towards nature, enhancing positive outcome expectancies. No significant correlations are found between CCRP and visiting nature or its determinants. Meaning that the conceptual model developed in this thesis was not validated by the results. The results did show a correlation between self-efficacy when feeling stressed and nature visits, between practical sociostructural factors and self-efficacy under some of the extreme weather conditions. Furthermore it showed a lowering self-efficacy mean under extreme weather conditions compared to normal conditions.

Discussion/conclusion. There are four possible argumentations as for why the model was not validated. Firstly, it could be explained by the positive attitude that the majority of the sample has towards nature and nature visits. The attitude determinant might weigh more than the CCRP factor. Secondly, there is a positive correlation between self-efficacy when feeling stressed and visiting nature. When people get nervous because of high CCRP, this will not limit them in visiting nature as their self-efficacy is still on the higher side. Thirdly, the absence of practical impediments when visiting nature is of importance. Our sample faces little to none practical impediments. Self-efficacy under some extreme weather conditions decreases when there are no practical impediments. Fourthly, the sample does not seem to link their concerns regarding climate change directly to visiting nature. Even though, the consequences of climate change, might actually influence them. This research supports the theories that being in nature is beneficial for, especially mental, health. Hopeful is that CCRP seem to have no effect on the amount and duration of nature visits. However, extreme weather conditions might. If men want to make people more aware about this or when future research elaborates on this topic, it seems important to talk about weather extremes rather than climate change. When you wish to decrease the chance of a lower self-efficacy in extreme weather conditions, practical impediments should be removed. This study was a first research linking CCRP to nature visits. Further research, for example in the form of quantitative longitudinal research, is needed to investigate this complex issue.

Key words: Nature visits, CCRP, social cognitive theory (SCT), climate change, nature, mental health

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1. Introduction

Mental health issues are an increasing worldwide problem. In 2016, approximately one in six people suffer from at least one mental health problem. The most prevalent disorder being depression. A condition that is directly decreasing one's quality of life (Mental Health Foundation, 2016). In the Netherlands this increase in mental health problems is also evident. The share of the population with mental health- or development disorders even lies above the world's average, as can be seen in figure 1. Over 4 out of 10 Dutch people suffer from mental health illnesses (Graaf, ten Have & Dorsselaer, 2010). Luckily, there is a possible solution; more and more studies provide evidence of how nature can contribute to a healthier and happier society (e.g. Kaplan, Kaplan & Brown, 1989, van der Lindern, Lymeus, & Hartig, 2017).

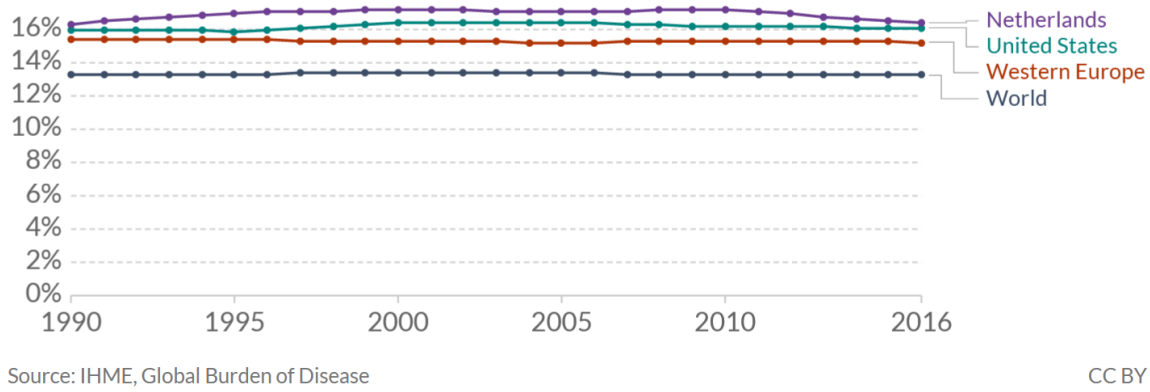

Figure 1 Share of population with mental health or development disorder 1990 - 2016. Source: IHME, Global Burden of Disease

One of the main causes of mental health disorders is stress (von Lindern, Lymeus, & Hartig, 2017). When researching health there are two pathways that can be considered: pathogenesis and salutogenesis. Whereas pathogenesis focuses on determinants and risk factors of disease, salutogenesis focuses on determinants of health and well-being (von Lindern et al., 2017). In this case the question therefore lies in how health can be maintained and developed despite being confronted with stressors (von Lindern et al., 2017). From the salutogenic perspective restoration of resources can help in maintaining mental well-being while facing stressful situations. Nature is one of the places with such a restorative ability. Nature is a setting in which people can recharge physically as well as mentally and emotionally. Visiting nature can therefore be an essential factor in maintaining mental-wellbeing (von Lindern et al., 2017; Hartig, Mitchell, De Vries & Frumkin, 2014; White et al., 2019). However, is this also the case, when there are more and more extreme weather conditions caused by climate change? Will spending time in nature still be as relaxing?

What if visiting nature is constrained by risk perceptions regarding extreme weather conditions? This thesis researches people's nature visits and if these are influenced by the impacts of climate change. Concepts and theories will be elaborated on in the conceptual framework of this thesis. First, background information is provided.

1.1 Theoretical background

Stressors are inherent to daily life. When people are incapable of dealing accurately with these stressors they can lose control of a situation. There is a difference between acute stress and chronic stress. Acute stress is caused by acute short-term stressors, for example temporary job-loss or one marital fight (McGonagle & Kessler, 1990). Chronic stress, on the other hand, has a high risk of causing long term mental health problems. They sneak into one's life almost unnoticed and have recurring nature, for example long-term marital problems (McGonagle & Kessler, 1990; Matheson et al., 2006).

A person depletes a portion of his or her resources every day in order to cope with the stressors they face in three possible manners. Firstly, it can be expressed in a decrease of external resources like income. Secondly, there can be a depletion of physical resources, e.g. through a disability or lack of physical strength (Kaplan, 1995).

Thirdly, and most often, stress is caused by the depletion of psychological resources, also known as directed attention. Directed attention has a limited time span and can easily be fatigued (Kaplan, 1995) The lack of it gives people generally the feeling that they 'do not have what it takes' to deal with a stressful situation (Kaplan, 1995). For example, focus is required when writing a thesis, yet focus is limited. After reading several articles, fatigue strikes. It will become more difficult to concentrate on the words in front of you. In other words, it feels like 'you do not have what it takes' anymore to read that one important article. This is a sign that your psychological resources are depleted and need to be restored by doing 'something else'. When the effect of this stressor is not resolved over time and becomes chronical, it can lead to adverse health outcomes like chronic stress and depression.

Resources therefore need to be periodically restored in a restorative environment in order to maintain mental well-being (von Lindern et al., 2017; Hartig et al., 2014). A restorative environment is required to provide a feeling of being away from your everyday tasks and difficulties. Being away from the factors that cause stress, it is a place where you can 'clear your mind' (Kaplan 1995). An example of such a place is nature. Nature can play a part in restoration of resources and thereby in reducing stress and improving mental health, contributing to healthier and happier people (Hartig et al., 2014; White et al., 2019; von Lindern et al., 2017; Maas, Verheij, de vries, Spreeuwenberg, Schellevis & Groenewegen, 2009). A natural environment can be a source for relaxation and quietness. The visual stimuli of nature like flowers, bees and butterflies or branches moving in the wind, ask for only effortless attention, giving your mind the opportunity to rest (Van den Berg, 2013; von lindern et al, 2017; Kaplan et al., 1989).

It needs to be noted that nature is not healing to all people every time. Nature can also be described as a place "where infectious agents, extreme weather, and geological events regularly sicken, injure, and kill people, often en masse"(Hartig et al., 2014, p. 208). Viewing nature in this way, it is less likely to contribute to mental health improvement. However, in general the positive 'nature-effect' is indeed experienced by people themselves. 96% of the Dutch state that they feel healthier and at peace after visiting nature (Van den Berg, 2013).

The possible relationship between mental well-being, stress and nature as a restorative environment is visualised in figure 2. In short, nature is a place where people can restore their resources when depleted by stressors faced in daily life. It thus plays a vital role in maintaining general well-being.

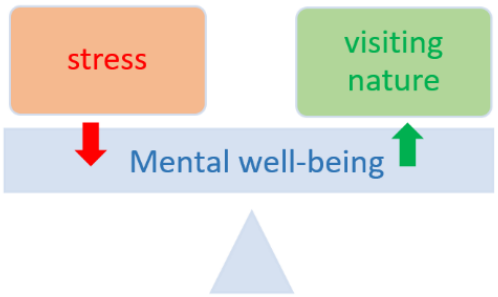

Figure 2 possible relationship between mental well-being, stress and visiting nature

1.2 Motivations and the issue of climate change

People have different reasons and motivations to visit nature: to jog, to get some fresh air, to clear their head, etc. However there are also certain perceptions that prohibit them from going into nature. A possible barrier for visiting nature can be extreme weather conditions and other consequences of climate change (Nebbe, 2006). Climate change is a 'hot topic' and can no longer be denied. Years of polluting the earth now lead to extreme weather conditions. It has led to an increase of days with temperature- and precipitation extremes (Stott, 2016). In 2019 the temperature in the Netherlands passed the magical border of 40^{o}C. with 40.7 ^{o}C, thereby beating the old heat record of 38.6^{o}C (KNMI, 2018). Extreme weather conditions make nature more and more a 'scary place' to visit (Hartig et al., 2014). The Netherlands will suffer from more extreme heats, heavy precipitation, droughts and storms (KNMI, n.d.). An example of is the storm triplet in 2022: Dudley, Eunice and Franklin. Being in the top 3 most heavy storms, storm Eunice caused the highest wind speed ever measured in the Netherlands (KNMI, 2022). Eventually, high climate change risk perceptions may weigh more than the determinants of visiting nature. When they do, climate change risk perceptions may prevent people from visiting nature. It is thus interesting to research if and how climate change risk perceptions influence how often nature is visited. Do climate change risk perceptions prevent people from visiting nature, thereby decreasing mental well-being? Not much research can be found on this subject, making this question relevant to research. Especially since extreme weather conditions will most likely become more frequent in the future (KNMI, n.d.; Scott, 2016)

It is plausible to assume that these high climate change risk perceptions prevent people from visiting nature. During snow storms or extreme heat, it is more than likely that people choose the comfortable inside of their house over the extreme cold, hot, wet and/or windy weather outside. The relationship between Risk perceptions, the determinants and the actual nature visits is what this thesis will examine. Although climate change is widely researched, the effects of global warming and climate change on human mental well-being though nature visits is still an underdeveloped area and still very much in its infancy (Nebbe, 2006). As both are increasingly important worldwide issues, it is of relevance to research a possible coherence. Especially as being in nature is increasingly seen as a solution to mental health issues.

1.3 Aim of the study

Nature can thus be considered as a restorative environment that is able to support mental-wellbeing. However, in a world facing climate change leading to extreme weather conditions, are people still willing and motivated to visit natural outside environments? All the information mentioned above leads to the following research question: *to what extent is climate change risk perception associated with visits to nature?* To help answer this research question it is split up into three sub-questions:

- *What do Dutch people consider to be visits to nature?*
- *What is Dutch people's climate change risk perception?*
- *To what extent are visits to nature and climate change risk perceptions associated?*

The following chapter aims to describe the theories supporting these questions. The research follows a salutogenesis approach when stating that a natural environment has a restorative quality. Chapter 3 will describe the research methods and target group. In chapter four, the research results are displayed and elaborated on. Followed by chapter 5, the discussion with theoretical and practical implications. Finally a short conclusion will be provided.

2. Conceptual framework

The purpose of this thesis is to explain the behaviour nature visits, with the help of its determinants and climate change risk perceptions (CCRP) by the use of relevant theory. CCRP is seen here as the potential moderator influencing the relationship between the determinants and actual nature visits. The theories are selected on their suitability of explaining visiting nature, while taking the

salutogenesis perspective as background. Determinants are defined with the help of social cognitive theory and empirical research on the topic.

From a salutogenic perspective, nature can be a setting in which people restore their depleted resources. Therefore it is important to understand what drives people to visit nature even though a continuously changing climate might influence their activities. But, what is nature exactly and when do you visit it? Individuals perceive nature all in a different way (Mausner, 1996). Different researchers inconsistently use different definitions in their studies, leading to different outcomes (e.g. Barton & Pretty 2010; White et al., 2019; Lindern et al., 2017). It can be called a "people-nature experience" or "interacting with nature" (Keniger, Gaston, Irvine & Fuller, 2013). It is therefore, first, important that a clear definition is made.

2.1 Defining visiting nature

In this thesis nature visits are considered to be *intentional* interactions with *outdoor* nature settings for at least two hours a week.

What is considered as nature is subjective and differs widely between sociocultural contexts and researchers (Barton & Pretty 2010, White et al., 2019, von Lindern, Lymeus & Hartig, 2017). A natural environment is defined as: "an environment with little or no apparent evidence of human presence or intervention" (Hartig et al., 2014, p. 208). This definition would exclude city parks and botanical gardens. Keniger et al. (2013) created a typology of nature settings, including those constructed under human influence, varying from indoor, urban, fringe, production landscape, wilderness, and specific species, see table 1. In order to analyse the possible influence of climate change on nature visit, it is important that the nature setting is outside. However, whether or not the outdoor setting is created by humans or untouched is not of importance. Nature in this thesis is therefore considered as an outdoor urban, fringe, production landscape and/or wilderness setting.

According to von Lindern et al. (2017) "nature exposure" can be measured in several ways. For example by the "amount of greenspace in one's neighbourhood […], the distance of one's home to the nearest publically accessible green space" (Lindern et al., 2017, p. 1), or by measuring the actual time spent in these greenspaces. The amount of greenspace near one's home, however, does not describe the direct contact one has with nature/green spaces, nor does the proximity of these greenspaces as people may travel to visit nature. Left then, is actual time spent in nature. This thesis follows White et al. (2019)'s argument that the required minimum time spent in nature is two hours a week.Their research shows that this amount of time is needed in order for nature interaction to have a positive effect on well-being.

Moreover, the behaviour of the person in regard to nature is of importance, i.e. the interaction (von Lindern et al., 2017). When working with a plant on your desk for example, you still direct your attention on your work. Resources are depleted, which can lead to stress. In this case, a plant as a natural environment does not work for restoration. Keniger et al. (2013) also created a typology of interaction with nature varying from indirect, to incidental to intentional (see table 2). To be able to measure the determinants of visiting nature, it needs to be a conscious *intentional* visit. Walking through a park while being on your way to work, is not seen as visiting nature in this thesis.

Table 1 different nature settings, typology created by Keniger et al. (2013)

Nature settings	Examples
Indoor	Plants
Urban	Gardens, roadside trees, public parks
fringe	Nature reserves surrounding a city
Production landscape	Agriculture, farms
Wilderness	Beach, Ocean, forests, national parks
Specific species	Pets, birds

Table 2 types of nature interaction

Nature interaction	Description
Indirect	Viewing nature, while not being present in it (pictures)
Incidental	Physical interacting with nature as a by-product of another activity (driving by trees on your way to work)
Intentional	Deliberately interacting with nature (a beach walk, gardening)

2.2 Determinants of visiting nature

What drives people to visit nature or what prevents them from doing so? People have different motivations for visiting nature. The following sections will look into these the motivations with the help of the Social Cognitive Theory (SCT) and empirical research on nature visits.

2.2.1 SCT

Social Cognitive theory (SCT) tries to explain what factors drive people's behaviour. SCT is one of the most prominent theories explaining human behaviour (Riley et al., 2016) and is therefore used in this thesis to help explain the behaviour of nature visits. It is beyond the scope of this thesis to provide an elaborative explanation and background of SCT. The key factors, however, will be shortly explained and are displayed in a model from Bandura (2004) that can be found in figure 3. One of the key factors of social cognitive theory is the visualised future. Expected outcomes of a certain action influence people's intention and behaviour (Bandura, 2005; Luszxzynska & Schwarer, 2005). The outcome expectancies consist of personal (physical and mental) and social outcome expectations. The other factors include perceived self-efficacy, i.e. the confidence in one's own capability, goals/intention and opportunity structures (Luszxzynska & Schwarer, 2005).

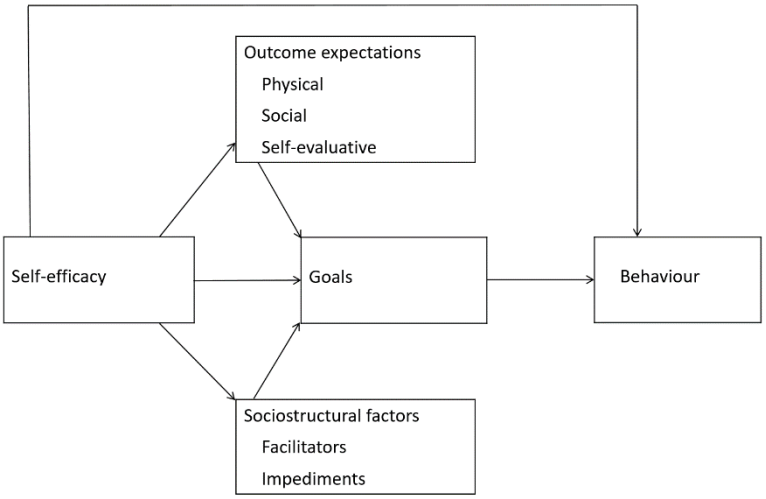

Figure 3 SCT model (Bandura, 2004)

2.2.2 Empirical research on motivations

Empirical research on nature interaction has shown that most of the motivations for visiting nature are interlinked with the beneficial outcomes of the natural environment on mental health (Pasanen, Neuvonen & Korpela, 2018; Pasanen et al., 2018; Degenhardt and Buchecker, 2012). This positive effect of nature on mental health is related to three mechanisms: the physical mechanism, the social mechanism and the stress reduction mechanism (Pasanen et al., 2018). The physical mechanism is active through physical activities, for example jogging. The social mechanism of nature

is present when people use the environment to socialize or is absent when people choose to be alone. The stress reduction mechanism goes hand in hand with the restorative power of nature and the Attention Restoration Theory (Pasanen et al., 2018).

Attention Restoration theory states that it is important for human beings to be able to direct your attention; to focus (von Lindern et al., 2017). The psychological resources that support directed attention are often the limited burden of being able to cope with situations (Kaplan, 1995). Nature can play a role in restoring these resources. Being in nature provides the opportunity of effortless attention. It frees you from everyday tasks that are a source of stress. In this way the neurocognitive foundations of directed attention get the possibility to rest and restore, therefore reducing stress and consequential health risks (Hartig, 2014; Kaplan, 1995).

Research has shown that when feeling stressed people's motivation to visit nature tends to grow (e.g. Degenhardt and Buchecker, 2012). One research links motivations to three kinds of goals (Degenhardt and Buchecker, 2012). First, personal use goals. These exist on the psychological function level, e.g. visiting nature with the goal of restoring one's concentration, and on the physical functioning level, for example to create muscle relaxation after spending the day in a seated position. Second are the social use goals. For example if one feels the need to socialise with friends or on the opposite to be alone. Lastly there are the use goals pertaining to the environment, for example the esthetical outlook of nature or the fresh air quality. These goals are fuelled by the strains of everyday life (Degenhardt and Buchecker, 2012), i.e. stressors. After working all day by oneself, one can feel the need to visit nature in order to meet with friends (social use goals) or to clear one's head (personal use goals), for example.

Other researches show similar determinants. Pasanen et al., (2018) link the motivations for visiting nature to the three mechanisms through which nature can be beneficial. This is depicted in table 3. It is clear that these motivations go hand in hand with the use goals mentioned above, these are added to the table to depict this connection.

Table 3 motivations and use goals of nature visits linked to the three outcome mechanisms of nature

Mechanisms	Motivations to visit nature	Use goals
The physical mechanism	- To be physically active	- Personal use goals on the physical function level
The social mechanism	- To be alone - To socialise	- Social use goals
The stress reduction mechanism	- To recharge - To experience nature	- Personal use goals on the psychological function level - Use goals pertaining to the environment

2.2.3 SCT and empirical evidence combined

Use goals and motivations can be linked to the perceived outcomes of the SCT model as they are based on an expected outcome. For example the expectation to feel less alone or more relaxed after a visit of nature. However, perceived outcomes can also be negative, influenced by for example low self-efficacy. Visualised futures are not only influenced by perceived benefits, but also by the perceived risks (Wang, Shen, Bartsch & Zuo, 2021). The researches mentioned above only interviewed people already visiting nature, hence causing a one-sided theory. Lacking is an important part of self-efficacy, namely: attitude and/or emotions toward nature. People with a fear of nature will develop a negative visualised future, prohibiting them from visiting nature at all. A positive attitude towards nature is thus necessary to stimulate nature visits. All motivations and use goals above are part of the visualised futures and goals as self-incentives and guide factors of social cognitive theory (Bandura, 2005; Luszxzynska & Schwarer, 2005). When one feels alone, it is anticipated that visiting nature will provide the interaction needed and thus results in a positive

outcome. A positive future is visualised and action is undertaken. On the other hand, when one visualises nature as a scary place, he or she will not visit it and, most likely, use another restorative environment, or none at all. The personal use goals are interlinked with the personal expectations of SCT and similarly, social use goals are linked to social expectations. Goals pertaining to the environment are related to the expectation that the visual outlook of nature is relaxing or that fresh air and sunlight are healthy. These are therefore also grouped here under personal outcomes.

Besides being influenced by attitude, self-efficacy is determined by perceived barriers, social influence and prior experience. Together, these factors regulate the level of personal confidence (Bandura, 2005; Luszxzynska & Schwarer, 2005). A person needs to be confident in his or her abilities and resources regarding visiting nature in order to take action.

Above, stressors are said to stimulate nature visits, however, chronic stressors can also negatively influence nature visits. Chronic stressors can prevent people from taking health protective action. Instead they can lead to unhealthy behaviours such as substance use (Schetter & Doblier, 2015). Stressors can thus decrease the level of self-efficacy.

Finally opportunity structures play a role (Bandura, 2005; Luszxzynska & Schwarer, 2005). Is the opportunity there to take action and thus, in this case, to visit nature? Is nature present or is the right infrastructure in place? Does your social environment stimulate you to visit the outdoors or to stay at home and is there enough free-time for a nature visit?

2.3 Climate Change Risk Perceptions

Perceived or actual danger, e.g. through (the possibility of) extreme weather conditions, can negatively influence the restorative effect of nature. Perceived risks are a determinant of inaction, rather than action (Bandura, 1998). Risk perceptions have a significant impact on peoples' attitudes and, interlinked to that, on the perceived negative consequences (Wang et al., 2021).
Risk perceptions are likely to prevent people from visiting nature at all as they will influence attitudes and visualised futures about visiting nature. When nature becomes a scary place, people will become less likely to visit it.

Through comparing different views and literature van der Linden (2014) developed the Climate Change Risk Perception Model (CCRPM). The model describes what dimensions influence the risk perception of climate change while controlling for socio demographics. These dimensions consist of cognitive factors, experiential processing and socio-cultural influences (van der Linden, 2014; van Eck et al, 2020). The exact factors are beyond the scope of this thesis, as here it is only of importance how high or low people's CCRPs are.

2.4 Towards a Conceptual Model

Figure 4 shows how all the concepts and theories mentioned above come together within the current research. As a base for the model, Bandura's model for SCT (Bandura, 2004) is used. The *behaviour* of interest in this case are *nature visits*. Inserted under outcome expectations are the use goals linked to the outcome mechanisms of nature mentioned above. People visualise a positive future in which these goals are achieved in a natural environment. This will motivate them to actually visit nature. Outcome expectations are influenced by self-efficacy. For example, when one has a positive attitude towards nature, the expected outcomes will be positive as well.

Added to the model are *CCRPs*. Risk perceptions in general are said to influence self-efficacy, while at the same time self-efficacy affects perceived risk (Wang et al., 2012). It is an interplay including attitude and perceived barriers. In this thesis it is hypothesized that CCRP has a negative influence on self-efficacy, mainly through the affection determinant (H1). Furthermore, outcome expectations are said to be influenced by perceived benefits and risks (Wang et al., 2012). Therefore it is secondly hypothesized that high climate change risk perceptions lead to more negative outcome expectations (H2).

Lastly, more broadly it is hypothesized that climate change risk perceptions negatively influence the actual nature visits (H3).

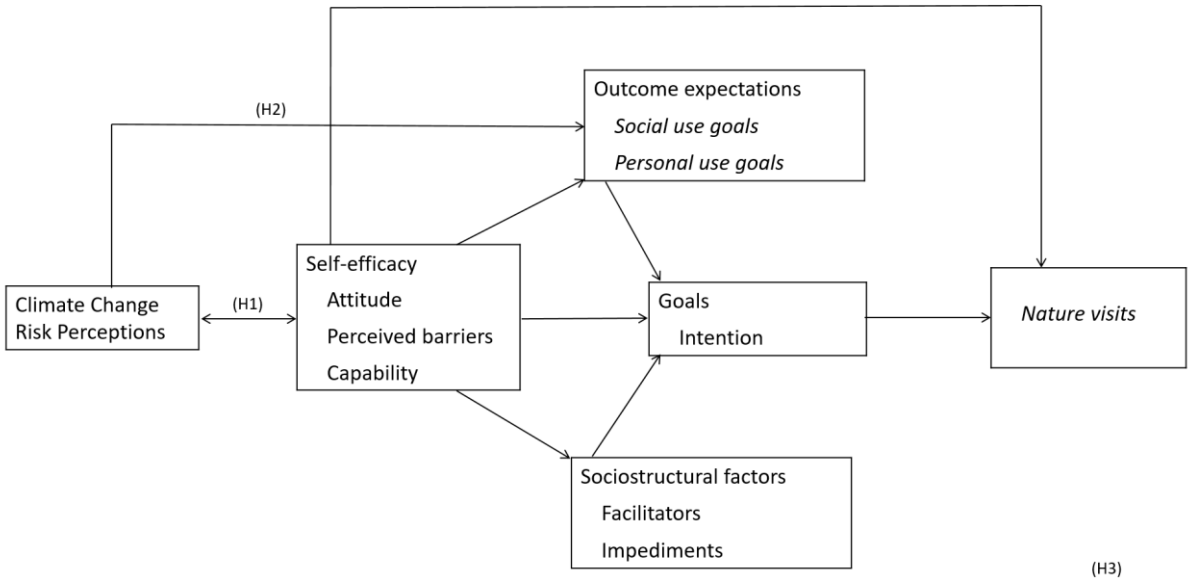

Figure 4 An integrated conceptual model aiming to explain nature visits with the help of its determinants

3. Methodology

3.1 study design

To investigate the relationship between CCRP and nature visits cross-sectional data will be gathered through a self-administered survey. Cross-sectional data fits this research as it is large-scale and descriptive and the goal is to describe and explain certain behaviours, i.e. nature visits (Boeije & 't Hart, 2016). Cross-sectional data provides the opportunity of gathering large amounts of descriptive data. This is of relevance for this specific study as it aims to describe a behaviour. The study design is descriptive observational as quantitative behavioural data will be gathered at one moment in time without interference of the researcher (Ott & Longnecker, 2015).

3.2 participants

The target population of this study are Dutch speaking inhabitants that visit nature at least once a week. In order to reach a large group of people, an online self-administered survey is chosen to be the most convenient method. The sample population are thus the Dutch that visit nature and have access to a computer, tablet or smartphone with internet. By using an online questionnaire, people without internet access are automatically excluded. This could be a limitation, however in the Netherlands 97% of the households have internet access (CBS, 2018). This high degree of internet penetration justifies the usage of an online questionnaire.

Participants will be recruited through the social media- and personal network of the researcher. This network includes family, friends, acquaintances and people reached through relevant Facebook groups. Within these networks people are approached and asked if they are willing to spread the questionnaire themselves inside their network. This is expected to create a snowball effect (Boeije & 't Hart, 2016). The sample will thus be a convenience sample.

3.3 Data collection

Before data collection, the survey was tested on four people of different ages, gender and educational background, to make sure the items and measurers are understandable and clear. The

test audience provided critical comments that helped the researcher to improve the survey. The survey is developed and published with the online survey tool Qualtrics.

Data collation took place in June. This period was chosen as it is before the summer holidays and has generally nice weather. This may stimulate people to visit nature more often during this period, which is beneficial for the survey results. On the other hand, a downside to this chosen period is that extreme heat waves could prohibit people from visiting nature.

The questionnaire starts with a consent item, followed by seven sections. The first six sections are related to the boxes of the model shown in figure 4. These sections include: visiting nature as a behaviour, CCRP, self-efficacy, outcome expectations, goals and sociostructural factors. The final, seventh, section contains socio-demographic questions. The questionnaire can be found in the appendix.

Most questions are based on or copied from existing questionnaires on CCRP (van der Linden, 2014) and social cognitive theory (Nematollahi & Eslami, 2018; Dewar et al., 2012; Luszczynska & Schwarzer, 2005) that have proven to be valid. These questionnaires were adjusted to the study context, meaning that mainly the studied behaviour is changed into nature visits. The questions are designed to be elaborate enough to measure all determinants, while being concrete enough to not be an overload for the respondents. The estimated response time was kept around 10 minutes, in order to make the questionnaire more accessible and tempting.

3.3.1 Nature visits definition

Nature and nature visits are often not elaborately defined in previous studies. In order to test if the definition of nature visits used in this thesis captures the respondents' actual understanding of nature visits, items are created to measure the outlook of the respondents on their nature visits regarding all aspects of our definition, namely *nature*, *duration* and *intention*.

This section consists of four items. The first item is a multiple choice question listing activities that are possibly undertaken when visiting nature (*intentions*). The activity options are based on the answers to a questionnaire conducted in The Netherlands regarding 'being outside' (Kloek, 2016) Example activities are hiking, cycling or gardening.. Multiple response options can be checked and an "other, namely…" option is added to the multiple choice questions in order to be as complete as possible.

Two items are open questions measuring the amount of times a respondent visits nature per week (M = 3.99, SD = 3.47) and the time in minutes such a visit consists of (M = 71.77 SD = 52.92) (*duration*). Finally, the fourth item is an open question were respondents are asked to fill in words that they associate with the concept '*nature'*.

3.3.2 CCRP

The questions on CCRP (Cronbach's Alpha = 0.90, M = 5.60, SD = 0.87) are translated from the questionnaire developed by van der Linden (2014). 8 measures on a 7-point Likert scale, ranging from very unlikely to very likely, not serious at all to very serious and very rarely to very frequently (translated into Dutch), are used to create an overview of one's risk perception. Included are both spatial and temporal dimensions. Questions include perceived risks on a personal-, society- and worldwide level (van der Linden, 2014; van Eck et al., 2020). Example questions are: *How serious would you rate current impacts of climate change around the world?* (1 = not serious at all, 7 = very serious) (worldwide level) and *In your judgment, how likely are you, sometime during your life, to experience serious threats to your health or overall well-being, as a result of climate change*? (1 = Very unlikely, 7 = Very likely) (personal level).

3.3.3 Social Cognitive Theory

Linking SCT to nature visits is uncharted territory. There are no previously executed questionnaires on this specific topic found. However, there are ample valid scales on SCT linked to other behaviours. Examples are the questionnaires of Nematollahi & Eslami (2018), Dewar et al. (2012) and Luszczynska

& Schwarzer (2005). Subscales of these validated surveys measuring SCT were used in this research. Moreover, Luszczynska and Schwarzer (2005), provided some general guidelines for developing a SCT based questionnaire that are used here as well.

The scales of the items mentioned above vary from 4- to 7-point Likert Scales, all proven to be valid and reliable (Nematollahi & Eslami,2018; Dewar et al., 2012 and Luszczynska & Schwarzer 2005). To maintain consistency throughout the survey, the items in this research are on a 7-point Likert scale.

3.3.3.1 Self-efficacy

There is no all-purpose measure of self-efficacy (Bandura, 2006). The measurement must therefore be adjusted to the behaviour of interest, in this case 'nature visits'. Generally, self-efficacy is measured with the help of confidence statements to measure people's capability of, in this case, visiting nature under normal and extreme/deviate circumstances (Bandura, 2006; Dewar et al., 2012). i.e. a statement that combines an action with a barrier. In this research, nature visits are combined with climate change related barriers. For example: *I am capable of visiting nature when there is a heat-wave taking place*. In the questionnaires of Nematollahi & Eslami (2018) and Luszczynska & Schwarzer (2005) similar constructions are used to measure self-efficacy. Bandura (2006) measures the level of confidence on a scale from 0-100 ranging from *cannot do at all* to *highly certain can do*. Other questionnaires have adjusted this scale varying from a 4-point Likert scale (Luszczynska & Schwarzer, 2005), to a 6-point Likert scale (Dewar et al., 2012) to a 10-point Likert scale (Nematollahi & Eslami, 2018), all tested and proven to be valid. For consistency, in this thesis a 7-point Likert scale is used to measure self-efficacy.

Attitude (Cronbach's alpha = 0.92, M = 5.60, SD = 1.06) is related to outcome expectations and can be measured by value assigned to perceived outcomes (Bandura, 2004). A semantic differential scale is made to measure the different feelings and values people assign to nature visits, namely: I*n my opinion, a nature visit is* …., followed by three affective measures and three instrumental measures with a 5-point scale. For example: *a waste of time* (1) or *useful* (5) (instrumental) and *nice* (1) or *annoying* (5).

3.3.3.2 Outcome expectations

Luszczynska & Schwarzer (2005) provide general rules on how outcome expectations can be operationalised in a questionnaire. The authors state they are best measured with the help of if/then statements and with the use of semantic structures. These statements can both be formulated with a positive outcome and a negative outcome (Luszczynska & Schwarzer, 2005).

In order to operationalise the outcome expectations (Cronbach's alpha = 0.78, M = 4.08, SD = 0.58) a question is developed to measure the feelings, i.e. personal use goals on the psychological function level, one experiences after visiting nature. This was measured on a 4-point Likert scale ranging from not at all to very much. E.g.: *to what extent do you feel proud after a nature visit* (1= not at all, 4 = very much). Furthermore, linked to the other goals of which the expectations consist, questions were developed to measure the physical and social perceived outcomes and the outcomes pertaining to the environment. For example: *If I visit nature, then I feel fitter (*1= not at all, 4 = very much).

3.3.3.3 Goals

Goals are similar to intentions. Generally they are measured with a question in the form of: 'I intend to do … within the next week'. The level of specificity needs to be adjusted to the context of the study. Furthermore it is important to focus the question on behaviour, rather than outcomes of this behaviour (Luszxzynska & Schwarzer, 2005). In this survey goals are therefore, measured with a question regarding the intention to visit nature every week, starting from tomorrow (M = 2.89, SD = 2.12). The answers are measured through a 7-point Likert scale ranging from completely agree to

completely disagree. To add to this an open question is included in which participants are asked how much time they intend to spend in nature as from next week (M = 184.44, SD = 174.61).

3.3.3.4 Sociostructural factors

The items measuring the sociostructural factors are based on the questionnaires developed by Nematollahi & Eslami (2018), Dewar et al. (2012) and Luszczynska & Schwarzer (2005). The questions are designed to measure the accessibility of nature in the direct proximity of the respondent, the social incentives to visit nature (family and friends), and the ability to visit nature regularly (available time) (Cornbach's alpha = 0.67). For example: *My friends and family visit nature.* Answers are measured on a 7-point Likert scale ranging from not true to completely true.

3.3.4 Socio-demographics

The demographic variables included in this study are age, gender, education, occupation and political preference. The political preference item turned out to have a programmatic error and had to be deleted from the results. These demographics are added for validity and to check if the sample population is representative.

3.4 Data analysis

The data was gathered through and downloaded from Qualtrics. The outcomes of the questionnaire are statistically analysed through IBM SPSS Statistics 27. SPSS is a software that can be used to process statistical data. First, non-completed and/or ambiguous answers are deleted from the data set. All open questions answers were transformed into the same style and unnecessary additions, such as points and commas, were deleted. Outliers are detected by making boxplots and are deleted from the dataset. Through SPSS, frequencies and percentages were calculated to provide an overview of the baseline characteristics of the sample. Educational levels are clustered into subcategories: high, middle and low following the classification of the CBS (CBS, 2019). In addition, the employment categories are clustered into larger sub-groups, namely: Employed (full-time, part-time and self-employed), unemployed (seeking work, incapacitated, retired, housewife/-man), student (high school, higher education) and other.

Scale reliability was checked through the calculation of Cronbach's alpha. When proven reliable, item scores are transformed into one average variable per scale. When Cronbach's alpha was too low, descriptive analysis is used to provide means, standard deviations and frequencies in order to provide valuable insights on, and visuals of, the determinants. To examine the possible relationship between CCRP, nature visits and it's determinants a Pearson correlation test was executed. The results of this test are visualised in a correlation table. As the hypothesized correlations were not proven to be significant, no further steps were taken.

4. Results

This section will provide an overview of the questionnaire results that can help answer the research question. Firstly, the socio-demographics of the sample population will be described. Following, the results of the nature visits definition items will be provided to describe the behaviour 'visiting nature'. Thirdly, the determinant of the nature visits are summarised. Respectively the items self-efficacy and attitude, outcome expectations, goals and Sociostructural factors are visualised. Fourthly the CCRP results can be found and finally a correlation table is given of the possible relationships that are hypothesised in our model.

4.1 Sample

A total of 129 completed questionnaires were available for statistical analysis. The demographics were analysed to provide an overview of the sample characteristics. An overview of these characteristics can be found in table 4.

The average age of the sample is 37.71 (SD = 17.10) ranging from 15 to 72. Notable is that a vast majority of the respondents, namely 88,3%, are female, whereas only 10,1% identifies as male.

Baseline Characteristic	*n*	*%*
Age		
<18	4	3.2
18-29	68	53.8
30-49	10	8
50-64	42	32.7
>65	5	4
Gender		
Male	13	10.1
Female	111	88.3
No answer preference	2	1.6
Education		
Low	21	16.3
Middle	44	34.1
High	64	49.6
Employment		
Employed	73	56.6
Unemployed	19	14.7
Student	21	24.1
Other	6	4.7

Note. N = 129

Table 4 Baseline characteristics

4.2 The behaviour: 'visiting nature'

When describing nature the most used words by the sample are 'animals', 'plants', 'trees', 'green', 'forests' and 'outside'. Furthermore, feeling wise, nature is mostly described as a place that is 'soothing', 'beautiful' and 'enjoyable'. When analysing the written descriptions, it becomes clear that the majority respondents attach overall positive labels to the experience of nature. As physical natural places to visit, beaches, forests and parks are most often mentioned.

By far, the most performed activity when visiting nature is *walking*. 95,3% of the respondents listed *hiking* as an activity performed during their nature visits. *Walking* is followed by *cycling* (68,2%) and *meeting friends and/or family* (48,1%) as most frequently undertaken activities. The activity least chosen is *spotting flora and fauna* with only being listed by 18,6% of the sample respondents. In the '*other, namely'* category a few activities where added. Such as relaxing, photographing, working,

reading, geocaching, and sailing. With reading and relaxing being mentioned most often.

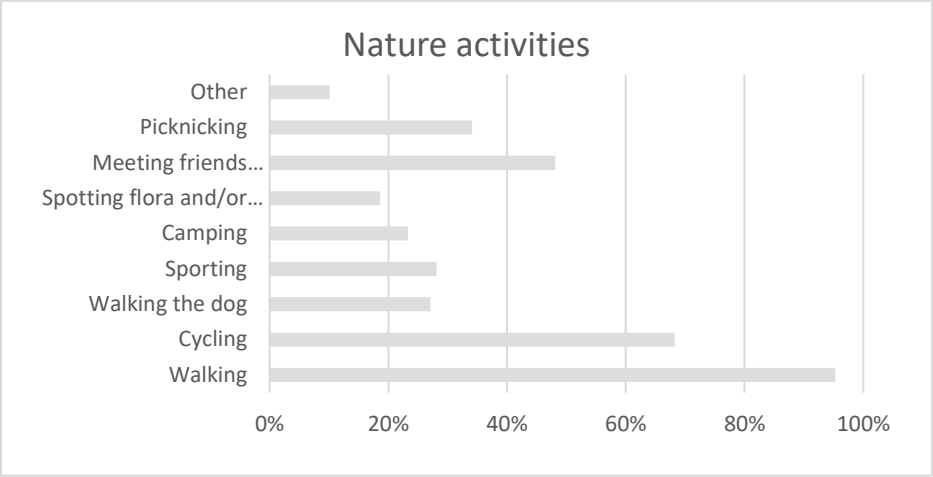

Figure 9 This figure shows the percentage of respondents that performs the activity during their nature visits. Respondents were able to list multiple activities

On average the respondents visit nature 4 times a week (M = 3.99, SD = 3.465) ranging from 1 visit to 24 visits a week. Time spend per visit is on average 72 minutes (M = 71.77, SD = 52.923). The average time spend in nature per person per week is 4 hours and 20 minutes.

4.3 SCT determinants

4.3.1 Self-efficacy and attitude

The self-efficacy questions cannot be transformed into one self-efficacy item, due to a low Cronbach's alpha. This is explainable by the fact that the questions are based on different categories of obstacles (e.g. wheater circumstances and mental circumstances). As the questions are still of value for the main question, they are separately still taken into account in the correlation table.

On average, respondents reported to be highly capable of visiting nature under 'normal circumstances' (M = 5.49, SD = 1.13). Around 75 percent of the respondents finds him or herself completely capable of visiting nature if all is considered 'normal'. When being alone or stressed people still find themselves capable of visiting nature with respectively a mean of 4.73 and 5.09.

However, when considering extreme weather conditions, as heatwaves, extreme rainfall, or (snow) storms, the self-efficacy significantly drops to when a majority of the respondents do not ought themselves capable anymore. With the lowest self-efficacy existing when there is extreme rainfall. The difference of capability between the different conditions is depicted in figure 6. The specific means and standard deviations can be found in table 5.

Table 5 Self-efficacy of visiting nature means and standard deviations

Self efficacy	M	SD
Under normal conditions	5.49	1.13
Heath wave	3.91	1.49
Storm	3.24	1.57
Extreme rainfal	2.47	1.31
When stressed	5.09	1.18
When alone	4,73	1.30

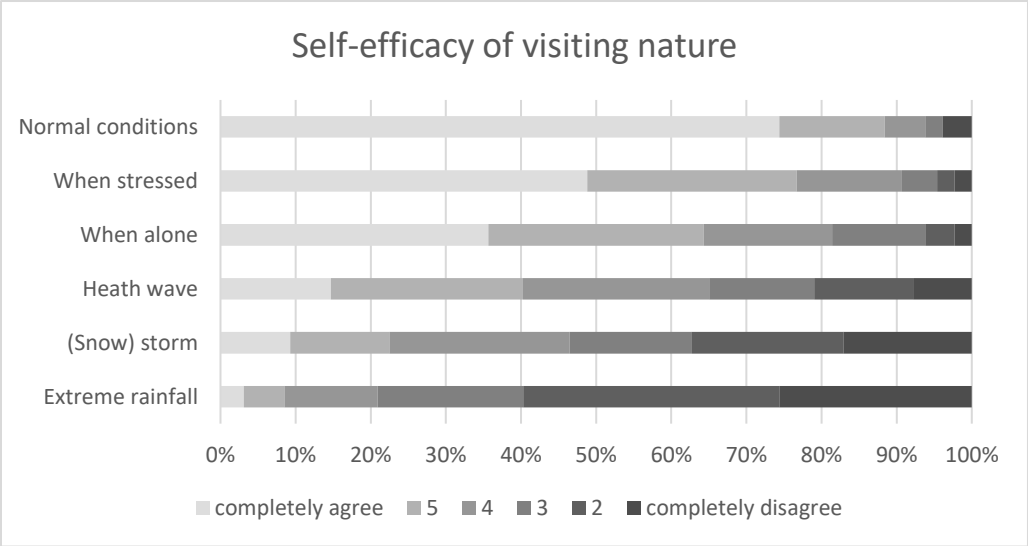

Figure 6 Self-efficacy of visiting nature. The figure depicts the division of how capable the sample ought themselves to visit nature under varying circumstances. Ranging from completely capable on the left side to completely incapable on the right.

This can, moreover, be seen at the results of the attitude measure as they show a rather high mean and a low standard deviation (M = 6,0746, SD = 1,06256). Indicating skewedness and little variance, meaning that the plurality of the respondents leaned more towards the positive perceived outcomes of nature visits, e.g. healthy, relaxing etc. over the negative ones as unhealthy and strenuous. The percentage distribution of respondents between the labels is depicted in figure 7.

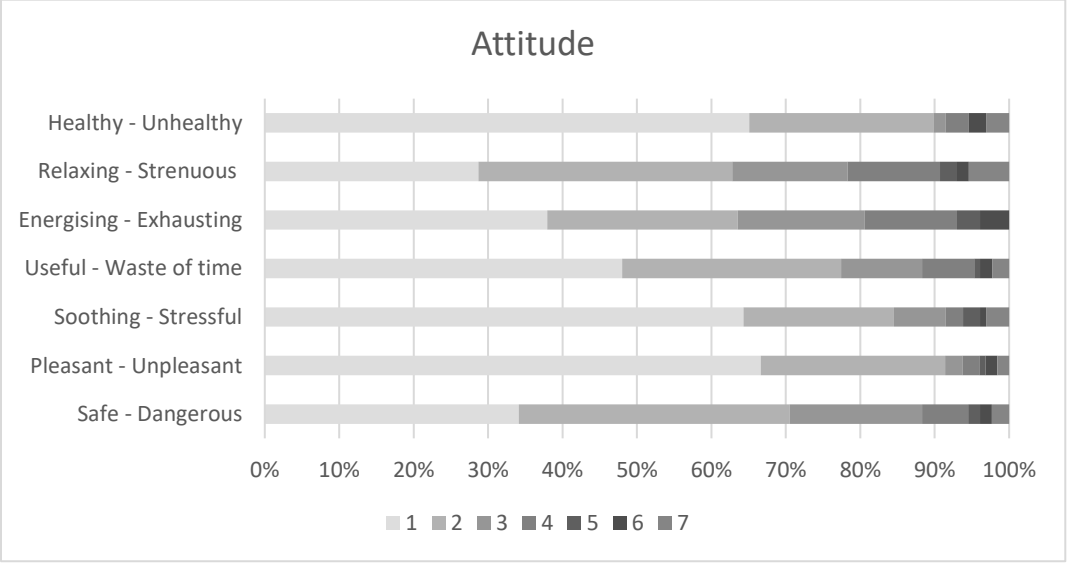

Figure 7 Division in percentages of the sample's attitude towards nature visits. Ranging from more positive values attached to nature visits on the right side towards more negative labels on the left

4.3.2 Outcome expectations

Figure 8 shows that overall the outcome expectations are positive. This is also indicated by the mean of 4.08 and standard deviation of 0.58. In general people feel calm (M = 4.15, SD = 0.716), healthier (M = 4.19, SD = 0.820), physically relaxed (M= 3.17, SD = 0.896), mentally relaxed (M = 6.28, SD = 0.91) and overall happy (M = 4.16, SD = 0.80) after visiting nature. Less lonely is not a feeling that is generally linked to visiting nature (M = 3.02, SD = 1.05). Furthermore, feelings of pride are less convincingly linked to nature visits as the other labels with a mean of 3.09 (SD = 0.96).

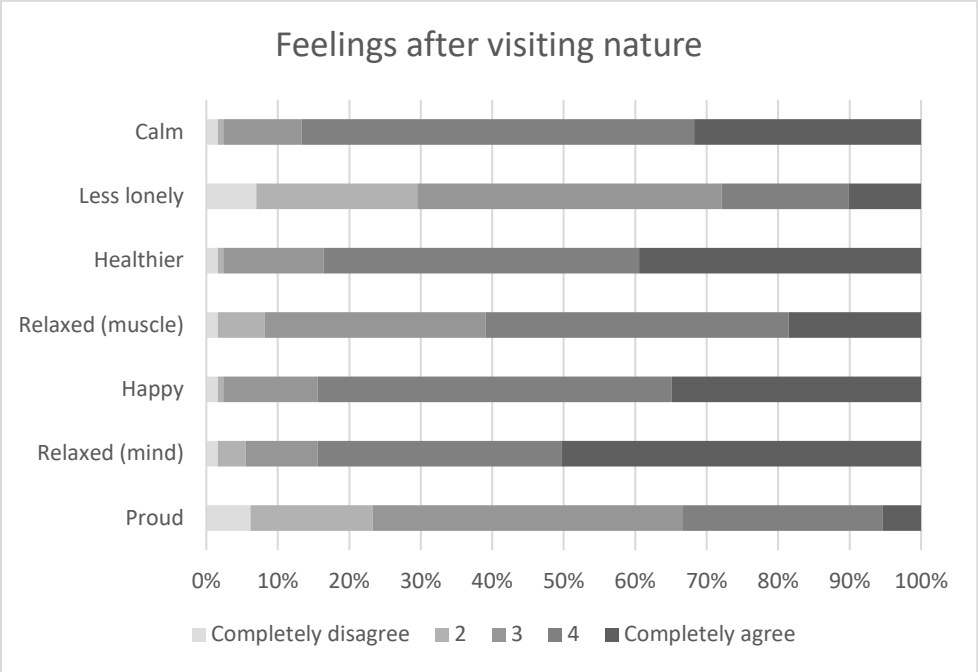

Figure 8 Division of the sample's outcome expectations of visiting nature in percentages. Ranging from positive expectected feelings on the left side to more negative outcomes on the right.

4.3.3 Goals

The majority of the respondents do have the intention to visit nature at least once every week from now on (M = 5.11, SD = 2.12). As this is a scale based on one item, one should be careful drawing conclusions from this. On average they intend to spend approximately just over 3 hours in nature. However the time intended to spend in nature varies widely among the population, with a standard deviation of 174.66 minutes.

4.3.4 Sociostructural factors

No significant practical impediments are experienced by the respondents as most means are above 6. Which means that people generally have a place of nature available to them and have the proper resources to visit it. Moreover, people feel like they do have enough spare time for nature outings. It has become clear however that these nature outings are most often done alone, without the company of friends and or family. However, as find out above, the respondents still find themselves capable of visiting nature when they have to do this alone. Having to go alone, is thus not seen as an impediment. There is no cohesion between the sociostructural factors. Which is explainable by the fact that there are very practical items and more social items. This is illustrated by a higher and significant Cronbach's Alpha (0.715) when the social item (friends and family visits to nature) is deleted.

Items are split up into two sections: practical possible barriers and social possible barriers. The practical possible barriers include having nature available in the neighbourhood, having the possibility to visit nature, having the correct infrastructure to visit nature and having enough spare time to visit nature. Together these questions have Cornbach's alpha of 0.714 (M = 5.99, SD = 0.89).

4.4 CCRP

(Cronbach's alpha = 0.904, M = 5.6017, SD = 0.87105) The respondents score relatively high on the 7-point Likert-scale to measure CCRP. With an average of approximately 5.6 it can be concluded that

the CCRP of the sample are quite high. Indicating that the respondents worry about the influence of climate change on their personal life, society and the world as a whole.

4.5 Correlations

Based on the earlier developed model we tested the relationships between CCRP, self-efficacy, attitude, outcome expectations, socio-structural factors, intention to visit nature weekly and intended time spend in nature as from the following week through a Spearman correlation test. All correlations are presented in table 6. The correlations that are of relevance for the research question and are thus hypothesised are highlighted and shortly analysed in this section. i.e. the correlations between CCRP and nature visits and it's determinants. On top of this, some other interesting significant correlation results are briefly discussed.

The only significant correlation found between CCRP and the other variables, is between CCRP and self-efficacy during a heatwave. It is a positive correlation, meaning that when people have a higher CCRP they also have a higher self-efficacy during a heatwave. This could be a coincidence as it is difficult to find a logical explanation for this. Besides, CCRP does not seem to correlate with nature visits themselves or its determinants.

Attitude is positively related to outcome expectancies, practical sociostructural factors, friends and family visiting nature, self-efficacy under normal conditions, self-efficacy when feeling stressed and self-efficacy when visiting nature alone. These are all logical correlations. When people have a positive attitude towards visiting nature, it is expected that the outcome expectations are more on the positive side as well. The positive correlation with practical sociostructural factors might mean that having more easy accessible nature close by, stimulates a positive outlook on nature. Nature might seem more attractive when you it is not a whole undertaking to arrive there. Seeing nature as a happy, safe place increases the self-efficacy of people to visit nature. This is also seen in the positive correlation between outcome expectancies and self-efficacy under mental and social impediments. Interesting is however that neither an increasing positive attitude towards nature , nor more positive outcome expectancies, a higher self-efficacy under extreme weather conditions. Perhaps because attitude changes when the weather is worse.

The availability of nature closely to one's home (i.e. practical sociostructural factors) has lots of positive correlations with the other variables. When the sample has more nature close by and has the spare time to visit nature, this increases their attitude towards nature, the outcome expectancies, the weekly intended and actual time one spends in nature, the self-efficacy under more extreme weather conditions as storm and heavy rainfall and the self-efficacy to visit nature when feeling stressed. When people have more options available in their neighbourhood to visit nature, their attitude becomes more positive as well.

As can be expected there is a positive correlation between one's self-efficacy under normal circumstances and the actual time spend in nature and one's goals regarding spending time in nature. A positive correlation among almost all self-efficacy variables indicate that the self-efficacy on different levels enhance each other.

In conclusion, even though CCRP does not seem to correlate to a lot of the other variables, there are still interesting outcomes that can be find in the correlation table. These, and the other statistical outcomes will be discussed and put into perspective in the next chapter.

Table 7 Correlation table

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. CCRP	-														
2. Attitude	0.14	-													
3. Outcome expectancies	0.02	0.43**	-												
4. Weekly time in nature	0.15	0.02	0.11	-											
5. SSF practical	0.03	0.27**	0.20*	0.18*	-										
6. Friends/family come along	-0,03	0.11	-0.02	-0.01	0.08	-									
7. Friends/family visit nature	-0.13	0.20*	0.12	-0.02	0.33**	0.44**	-								
8. Intention weekly visits	0.15	0.13	0.16	0.29**	0.23**	-0.01	-0.11	-							
9. Intention minutes	0.06	0.13	0.03	0.64**	0.21*	0.04	0.03	0.18*	-						
10. Self-efficacy normal	0.15	0.23**	0.15	0.29**	0.17	0.06	0.13	0.28**	0.20*	-					
11. Self-efficacy Heatwave	0.19*	0.14	0.01	0.10	0.21*	0.02	0.21*	0.04	0.14	0.14	-				
12. Self-efficacy storm	0.14	0.17	0.08	0.06	0.31**	0.14	0.16	0.03	0.04	0.17*	0.33**	-			
13. Self-efficacy heavy rainfall	0.08	0.06	-0.03	0.15	0.012	0.05	0.05	0.00	0.14	0.09	0.31**	0.46**	-		
14. Self-efficacy when stressed	0.15	0.27**	0.30**	0.38**	0.23*	-0.02	0.05	0.21*	0.29**	0.34**	0.39**	0.25**	0.19*	-	
15. Self-efficacy when alone	0.10	0.18*	0.21*	0.16	0.14	-0.16	0.09	0.17	0.08	0.25**	0.30**	0.16	0.23**	0.55**	-

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

5. Discussion

The aim of this study was to examine the extent in which climate change risk perceptions are associated with visits to nature. Plenty research can be found on the beneficial aspects of visiting nature and the restorative effects for one's mental health. There is limited literature on the potential relationship between CCRP and nature visits and therefore the possible indirect effect on mental health. This thesis provides new insights that can guide further research on the motivations and impediments of visiting nature. Nature visits, are investigated here with the help of the SCT determinants to explore if CCRP influences the relationship between these determinants and the behaviour. To answer the research question, it was split into three sub-questions. These will provide the structure for this discussion, followed by limitations and strengths-, future research-, and recommendation sections.

What do Dutch people consider to be visits to nature?

The current academic literature lacks a clear definition on nature and visiting nature, resulting in inconsistent outcomes (Barton & Pretty 2010; White et al., 2019; Lindern et al., 2017). It is said that each individual perceives nature in a different way, making it difficult to construct one single definition (Mausner, 1996). In this research, the sample might have different associations with nature, but overall the same words are mentioned. Concluding from the survey results, the way Dutch envision and experience nature visits, is in line with the definition developed in this thesis: *nature visits are considered to be an intentional interaction with an outdoor nature setting for at least two hours a week.* Dutch see nature as an outside green space and undertake mostly intentional nature related activities like hiking and cycling. None of the respondents named indoor green places, such as plants, as being nature. This indicates that people do not fully agree with the nature settings typology of Keniger et al. (2013), in which indoor plants are categorised as being a nature setting as well.

The sample overall describes nature as a soothing, enjoyable and beautiful place; a place in which relaxing activities are undertaken. Moreover, they agree with nature being a healthy, energising place to be in. A majority of the sample perceive nature as a healthy, relaxing and safe place, rather than a fearful place to be in. This picture of nature is in line with previous studies that state that nature is a restorative environment, beneficial for people's general health and wellbeing by providing a suitable place for dealing with daily stressors (von Lindern, Lymeus, & Hartig, 2017). This research supports the theory that people's motivations to visit nature are linked to the beneficial mechanisms of nature (Pasanen et al., 2018) and personal use goals (Degenhardt and Buchecker, 2012). With one exception: the social aspects. The sample does not seem to visit nature to socialise and to feel less lonely. Which is understandable as they also state to visit nature mostly by themselves. The social mechanism seems to therefore lean more into the need to be alone, than the need to socialise.

The two hour minimum included in the definition, in order to make nature visits beneficial to the mental well-being (White et al., 2014) seems to be no threshold for the sample. With an average of spending 4 hours and 20 minutes in nature every week, this criterion is amply achieved. These results are in line with earlier research done by Kloek (2016) in which it is stated that 78% of the Dutch enjoys being outside with an even higher average of time spend outside, namely 3,5 hours per day.

What is Dutch people's climate change risk perception?

The CCRP of the research sample is relatively high, indicating a certain concern regarding the climate change and its linked risks. This high risk perception is supported by research done by the Centraal Bureau voor de Statistiek (CBS) (2021). Their research illustrates that 62% of the Dutch thinks climate

change is a big problem in this point of time and 76% thinks climate change will cause large problems in the future (CBS, 2021)

To what extent are visits to nature and climate change risk perceptions associated?

The third sub-question answers the research question, namely: *to what extent is climate change risk perception associated with visits to nature?* To answer this, three hypotheses based on the developed conceptual model were tested. Firstly, it was hypothesized that CCRP has a negative influence on self-efficacy, mainly through the attitude determinant. Secondly, it was hypothesized that high climate change risk perceptions lead to more negative outcome expectations. Thirdly, it was hypothesized that climate change risk perceptions have a negative correlation with nature visits. After conducting quantitative analysis, none of the hypotheses have proven to be significantly true. The theoretical assumptions underlying the model developed in this thesis were not confirmed by the results. Overall, the research and results show that it is a highly complex problem. There are several possible reasons why the model was proven to be invalid in this research.

The positive attitude that the majority of the sample has towards nature and nature visits can be a first possible explanation of why the theoretical assumptions underlying the model were not validated. It seems that the attitude is a far stronger motivator for nature visits than CCRP. Furthermore, the outcome expectancies results show that after visiting nature, people expect to feel calmer, healthier, happier and overall more relaxed. In Kloek's (2016) research it is found that people that enjoy being outside also spend more time in nature. However, contrasting this, in this study there is no significant correlation found between attitude and actual time spend in nature. A possible reason for this could be the ceiling effect of the attitude variable. Most participants have a high attitude value. When all or most of the values are on the higher side, this creates little variance that can influence and/or limit meaningful data analysis (McBee, 2010).

Secondly, the lack of validity might be explainable by looking into the self-efficacy determinant. The self-efficacy of the sample under normal circumstances and when stressed, has a positive correlation with nature visits. This indicates that the vast majority of the participants, in general, feel capable of visiting nature. The fact that self-efficacy is still relatively high when people feel stressed, is a positive sign, as nature can help coping with daily life stressors. These results are in line with previous research that has stated that when people feel stressed, they tend to want to visit nature even more than normal and profit more from the restorative effect of nature (Degenhardt and Buchecker, 2012). When people get nervous because of high CCRP, this thus seems to not limit them in visiting nature as their self-efficacy is still on the higher side. In fact, in contrary to the initial hypotheses, it might even encourage them to visit nature to experience some relaxing.

Thirdly, whether or not there are practical impediments seems to be an important determinant. A positive correlation is found between practical sociostructural factors and self-efficacy during a heatwave and storm. Meaning that more easily accessible places to visit nature ensures a higher self-efficacy under some of the extreme weather conditions. This might imply that as long as nature is close by, people feel less limited by external weather factors. The lack of practical impediments faced by the sample could be the third possible explanation of why the model was not validated.

Fourthly, people do not seem to directly link their concerns regarding climate change to their nature visits. This seems to contrast earlier studies that state climate change consequences, in particular extreme weather conditions, are a possible barrier for visiting nature (Nebbe, 2006). Interesting is that even though there was no correlation found between CCRP and nature visits or its determinants, the separate self-efficacy item means depict a difference in self-assumed capability between different weather circumstances. The self-efficacy means seem to significantly drop when confronted with heavy rainfall, a heatwave or a (snow)storm. Indicating that even though people themselves do not feel like climate change is a barrier to their nature visits, its consequences do lower their self-efficacy. An explanation for this might be that the majority of the Dutch still view

climate change as a problem, which consequences will appear in the future. It is still often viewed as something that is abstract and hypothetical (CBS, 2021).

5.1 Limitations and strengths of the research

This study entails several limitations and strengths that are important to note. First, the data used in this thesis is gathered through an online survey. Self-reported data has as limitation that it relies on the participant's memory, perception and honesty. There is the risk that people might not remember their amount or duration of nature visits precisely, or that having a bad or good day influences their response. Furthermore, even though the data is gathered anonymously there is still the possibility that people answer what they ought to be socially desirable or in ways that they expect the researcher would like. This could potentially lead to self-report bias (Bauhoff, 2014). Nevertheless, the online survey enabled us to increase the sample size. This, method of data gathering ensured low key participation to the study.

Secondly, the sample is gathered through convenience sampling. Participants were approached via the researcher's personal network and social media channels. Convenient sampling is a useful method to gather large samples of data. However, it has the risk of gathering a sample that is not representative for the whole population. In this case, the vast majority of the sample is female (88.3%) and also the age of the participants is not evenly divided between the age-groups. On the one hand, this is a biased sample. On the other hand, it provides relevant information. Are females in the age category 19-29 perhaps more interested in the topics nature and climate change? Earlier studies have shown that especially highly educated, young people and women in the Netherlands are, indeed, more worried about the consequences of climate change (CBS, 2020). This could mean that this research reflects this, or it means that it provides a biased image of Dutch CCRP. What people participated was outside of the control of the researches. Despite this, a quite large sample was found to base the results on.

Thirdly, the survey is spread during the covid-19 pandemic. A time in which activities were limited due to the lockdown. Visiting nature is one of the few activities that remained always allowed. It is a time in which more people than usual go outdoors and visit natural environments. This might have influenced the results of the study, especially regarding the time spend on nature visits. On the other hand, because more people visit nature during the pandemic, more people were fit to fill in the questionnaire and share their opinion on nature visits, leading to a larger sample.

Fourthly, the self-efficacy scales and sociostructural factor scale both had a low Cronbach's Alpha, indicating a low reliability. For both this can be explained by the different dimensions of the questions. Self-efficacy includes attitude, perceived barriers and capability. Creating scales on self-efficacy regarding nature visits, was uncharged territory. In this study capability and perceived barriers were put into one item, as self-efficacy is normally measured combining an action with a barrier. Hence, in this study: visiting nature and climate change related barriers. However, there were also other sort of barriers added that seemed useful for the study, namely stress and loneliness. On top of this, there was one statement without a barrier. The idea behind this was that the different kind of barriers and the situation without a barrier could be compared to each other. However, the result is that the items are so different, that self-efficacy as a scale is no longer reliable. Individually, the self-efficacy items were still valuable for the research outcome and were therefore, separately added to the correlation analysis. The same problem occurred with the sociostructural factor scale. Based on existing questionnaires, a scale was developed to measure the sociostructural factors regarding nature visits. However, this scale had a low Cronbach's alpha, probably because the contexts of the questions were too different, and is therefore not reliable. It still provided interesting information by showing which sorts of sociostructural factors play a more important role and which are less of significant regarding nature visits. As this means some results are based on the single items, conclusions should be made carefully and no practical advice should be based on this conclusions.

5.2 Future research

As mentioned before, this is a first study on this topic and it raises almost more questions than answers. However it provides valuable insights that future researches could build on.

According to the existing SCT theory a behaviour, in this case nature visits, is directly and indirectly influenced by outcome expectations, self-efficacy, goals and sociostructural factors (Bandura, 2005; Luszxzynska & Schwarer, 2005), this implies that a correlation should be found between these different determinants and the behaviour nature visits. When looking at the correlation results of this research, a positive correlation exists between nature visits and the practical availability of nature close by, and between nature visits and self-efficacy under normal circumstances and when stressed. There is no significant relationship between outcome expectancies and nature visits or between attitude and nature visits. This is in contrast with what was expected according to the SCT model of Bandura (2004). Furthermore, the practical sociostructural factors, i.e. options to visit nature close by, sufficient infrastructure and enough spare time, seem to be an important determinant of visiting nature. Besides having a positive correlation with the studied behaviour, there is also a positive relationship between practical factors and attitude, outcome expectations, intention, and self-efficacy under several circumstances, including some extreme weather circumstances (storm and heatwave). The sociostructural factors thus seem to be a more important factor in this case than is implied in the SCT-model from Bandura (2004. This could mean that the SCT-model is less suitable for looking at the behaviour of nature visits, or that the model variables have different influences on the behaviour of nature visits. Perhaps other models would be more fitting or lead to different outcomes, for example the theory of planned behaviour. This could be considered when conducting future research on the topic.

It is interesting that the thesis results, on the one hand, show no correlation between CCRP and (intended) nature visit and its determinants, nor between perceived self-efficacy and (intended) nature visits. While, on the other hand, self-efficacy drops considerably when extreme weather conditions come to stage. A lower self-efficacy should, according to the SCT model, influence the behaviour, in this case visiting nature. However, here such a correlation was not found under extreme weather conditions. This might be because of the unreliable self-efficacy scales. If more quantitative research is undertaken on this topic, attention should go to developing reliable self-efficacy. Multiple scales should be tested and perhaps several forms of self-efficacy should be controlled for. On top of this, random sampling should be done to assure a representative sample.

Perhaps, even more interesting would be, a quantitative longitudinal research on the topic. As this research consists of a survey, it would be valuable to examine if qualitative research, including interviews and participatory observations, would provide the same or different results. Furthermore, it would provide more in-depth information on the topic that could provide new insights. Participatory observation and interviews could help in providing new valuable insights on the self-efficacy and nature visits under various weather conditions and on if and how people link this to climate change. On top of this, participatory observation would eliminate a potential self-report bias. Longitudinal research could provide insights in the consistency of nature visits through different conditions and seasonal times.

5.3 Practical recommendations

Even though the hypotheses regarding CCRP and nature visits were not proven to be right, the research does underline that being in nature is beneficial for health, especially when people suffer from stress related health issues. It shows that people are even extra motivated to visit nature when they are feeling stressed. Overall this is a good sign for mental health and nature assisted therapy, as this means stress will stimulate people to restore depleted resources in a natural environment. Mental health care providers should make use of it, when providing therapy. For example by offering outdoor therapy sessions or by encouraging clients to visit nature in their spare time.

Good news for mental health is that CCRP seem to have no effect on the amount and duration of nature visits. However, extreme weather conditions might. If men want to make people

more aware about this, or when future research elaborates on this topic, it seems important to talk about weather extremes rather than climate change. Concrete examples of extreme weather conditions in a relatable context should be used, to test the effects of it or to gather opinions on the topic. This is an important implication for communication strategies. Furthermore, availability and accessibility of nature closely to one's home plays an important role in maintaining self-efficacy under extreme weather conditions. When nature assisted therapists or municipalities want to encourage and maintain nature visits, even in times of bad weather conditions, it is important to create enough available, easily accessible nature sites. For example, by creating city parks or by improving the infrastructure.

Conclusion

The research question that this thesis aimed to answer is: *to what extent is climate change risk perception associated with visits to nature?* To answer this question it firstly, examined what Dutch people consider to be nature visits and what their climate change risk perceptions are. The participants of this study overall view nature as an outside, positive, green place to be in, in which intentional nature activities are undertaken such as hiking and cycling. Moreover, they feel healthier and more relaxed after visiting nature. The results underline that people link beneficial health outcomes to visiting nature. Generally, they believe nature is beneficial for mental health. This thesis even shows that the self-efficacy to visit nature increases in stressful situations, encouraging a natural manner to restore depleted resources.

While the research shows that the Dutch have relatively high climate change risk perceptions, this does not seem to influence their nature visits. At first sight the association between climate change risk perceptions and visits to nature, thus seems to be insignificant. This is good news for mental well-being and nature-assisted mental health care providers. However, notable is that the average self-efficacy drops under extreme weather circumstance. Which is alarming, as extreme weather conditions will become increasingly common in the (near) future. To increase self-efficacy during extreme weather circumstances, it is important to ensure close-by and easily accessible nature sites for all people as this increases people's self-efficacy during heatwaves and (snow) storms.

Linking climate change risk perceptions to nature visits is an underdeveloped topic, still in its infancy. This research was a first study on the topic, that has proven it to be a highly complex problem. Overall, the research provides valuable insights for future research to build on.

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Appendix: Qualtrics survey

Vragenlijst Natuur bezoek en klimaatverandering

Start of Block: consent

Beste deelnemer,

Deze vragenlijst maakt onderdeel uit van een onderzoek naar klimaatverandering en natuurbezoek. Het invullen van de vragenlijst zal ongeveer 10 minuten in beslagnemen. Alle antwoorden zullen vertrouwelijk en anoniem worden verwerkt. Deelname is geheel vrijwillig. Bedankt voor uw medewerking.

Met vriendelijke groet,

Noale van der Horst,
Masterstudent International Development Studies
Wageningen University & research

Q1 Gaat u akkoord met het deelnemen aan deze vragenlijst en het verwerken van uw antwoorden zoals hierboven vermeld?

- ○ Ja, ik ga akkoord (1)
- ○ Nee, ik ga niet akkoord (2)

Skip To: End of Survey If Gaat u akkoord met het deelnemen aan deze vragenlijst en het verwerken van uw antwoorden zoals hi... = Nee, ik ga niet akkoord

End of Block: consent

Start of Block: Nature visits

De volgende vragen gaan over uw kijk op de natuur en natuurbezoek.

In dit onderzoek wordt natuur omschreven als een omgeving buitenshuis in de openlucht. Dit kan een stads-, rand-, productielandschap zijn of een wildernis omgeving. Voorbeelden zijn stadsparken, botanische tuinen, stranden en/of bossen.

Het is belangrijk dat het bezoek aan zo'n natuurlijke omgeving een bewuste besteding van uw tijd is. Het toevallig passeren van een park onder weg naar uw werk, telt in dit onderzoek bijvoorbeeld niet mee.

Q3 Wat doet u tijdens uw natuurbezoek? Er zijn meerdere antwoorden mogelijk.

- [ ] Wandelen (1)
- [ ] Fietsen (2)
- [ ] Hond uitlaten (3)
- [ ] Sporten (4)
- [ ] Kamperen (5)
- [ ] Dieren en/of planten spotten (6)
- [ ] Afspreken met vrienden/familie (7)
- [ ] Picknicken (8)
- [ ] Anders, namelijk.. (9) _____

4 Hoeveel keer bezoekt u, gemiddeld genomen, de natuur per week?

_____

Q6 Hoe lang bent u gemiddeld genomen tijdens een bezoek in de natuur (tijd in minuten)?

_____

End of Block: Nature visits

Start of Block: CCRP

De volgende vragen gaan over uw visie op klimaatverandering.

Q11 Hoe bezorgd bent u over het algemeen over klimaatverandering?

	Helemaal niet bezorgd (1)	Niet bezorgd (2)	Niet echt bezorgd (3)	Neutraal (4)	Een beetje bezorgd (5)	Bezorgd (6)	Heel bezorgd (7)
Hoe bezorgd bent u over klimaatverandering? (1)	○	○	○	○	○	○	○

Q12 Hoe waarschijnlijk is het volgens u dat...

	Zeer onwaarschijnlijk (1)	Onwaarschijnlijk (2)	Enigszins onwaarschijnlijk (3)	onbeslist (4)	Enigszind waarschijnlijk (5)	Waarschijnlijk (6)	Zeer waarschijnlijk (7)
...u ergens in uw leven te maken zult krijgen met ernstige bedreigingen voor uw gezondheid of algemeen welzijn als gevolg van klimaatverandering? (1)	○	○	○	○	○	○	○
...klimaatverandering schadelijke, lange-termijn gevolgen heeft voor de maatschappij? (2)	○	○	○	○	○	○	○

Q13 Hoe ernstig vindt u de bedreiging van klimaatverandering voor...

	Helemaal niet ernstig (1)	Niet ernstig (2)	Niet echt ernstig (3)	Neutraal (4)	Een beetje ernstig (5)	Ernstig (6)	Zeer Ernstig (7)
...de natuurlijke omgeving? (1)	○	○	○	○	○	○	○
...u persoonlijk? (2)	○	○	○	○	○	○	○
....Nederland? (3)	○	○	○	○	○	○	○
...de wereld? (4)	○	○	○	○	○	○	○

Q14 Hoe vaak maakt u zich zorgen over de negatieve gevolgen van klimaatverandering?

	Zeer zelden (1)	Zelden (2)	Een beetje zelden (3)	Neutraal (4)	Soms (5)	Vaak (6)	Zeer vaak (7)
Hoe vaak maakt u zich zorgen over de negatieve gevolgen van klimaatverandering? (1)	○	○	○	○	○	○	○

End of Block: CCRP

Start of Block: Self efficacy

De volgende stellingen gaan over of u de natuur bezoekt onder de omstandigheden genoemd hieronder.

Q14 Ik ben in staat de natuur te bezoeken... (en doe dit ook)

	Helemaal mee oneens (1)	(2)	(3)	(4)	(5)	Helemaal mee eens (6)
...onder normale omstandigheden (1)	○	○	○	○	○	○
...als er een hittegolf is (2)	○	○	○	○	○	○
...als er een (sneeuw) storm is (3)	○	○	○	○	○	○
...natuur te bezoeken bij extreme regenval (4)	○	○	○	○	○	○
...als ik mijzelf gestrest voel (5)	○	○	○	○	○	○
...als ik alleen ben (6)	○	○	○	○	○	○

Q16 Een bezoek aan de natuur vind ik ...

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	
Fijn	○	○	○	○	○	○	○	Hinderlijk
Gevaarlijk	○	○	○	○	○	○	○	Veilig
Prettig	○	○	○	○	○	○	○	Onprettig
Stressvol	○	○	○	○	○	○	○	Rustgevend

Q17 Een bezoek aan de natuur vind ik....

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	
Tijdverspilling	○	○	○	○	○	○	○	Nuttig
Vermoeiend	○	○	○	○	○	○	○	Energiegevend
Ontspannend	○	○	○	○	○	○	○	Inspannend
Gezond	○	○	○	○	○	○	○	Ongezond

End of Block: Self efficacy

Start of Block: Outcome expectancies

De volgende vragen gaan over uw persoonlijke gevoelens en verwachtingen over het bezoeken van natuurlijke omgevingen.

Q19 In hoeverre bent u het eens met de volgende stellingen?

Als ik de natuur bezoek, voel ik mij ...

	Helemaal mee oneens (1)	(2)	(3)	(4)	Helemaal mee eens (5)
...trots (1)	○	○	○	○	○
....gestrest (2)	○	○	○	○	○
...kalm (3)	○	○	○	○	○
...gelukkig (4)	○	○	○	○	○
...ontspannen (spieren) (5)	○	○	○	○	○
...gezonder (6)	○	○	○	○	○
...minder eenzaam (7)	○	○	○	○	○

End of Block: Outcome expectancies

Start of Block: Goals

Q20 De volgende vraag gaat over uw persoonlijke doel omtrent natuur bezoek.
In hoeverre bent u het eens met de volgende stelling:

	Helemaal mee eens (1)	(2)	(3)	(4)	(5)	(6)	Helemaal mee oneens (7)
Ik ben van plan om vanaf morgen elke week de natuur te bezoeken (1)	○	○	○	○	○	○	○

Q21
Hoeveel tijd, in minuten, bent u van plan volgende week in totaal door te brengen in de natuur?

*2x 15 minuten geeft bijvoorbeeld een antwoord van **30** minuten in totaal*

_____

End of Block: Goals

Start of Block: Sociostructural factors

Q22 In hoeverre gaan de volgende stellingen op voor u?

	Helemaal niet (1)	(2)	(3)	(4)	(5)	(6)	Helemaal wel (7)
Ik heb in mijn directe omgeving natuur tot mijn beschikking (1)	○	○	○	○	○	○	○
Ik heb de mogelijkheid om natuur te bezoeken (2)	○	○	○	○	○	○	○
In mijn omgeving is de juiste infrastructuur om natuur te bezoeken (3)	○	○	○	○	○	○	○
Mijn vrienden en familie bezoeken regelmatig de natuur (4)	○	○	○	○	○	○	○
Mijn vrienden en/of familie gaan mee als ik de natuur bezoek (5)	○	○	○	○	○	○	○
Ik heb genoeg vrije tijd om de natuur te bezoeken (6)	○	○	○	○	○	○	○

Page Break

Q3 Hoe zou u zelf de 'natuur' omschrijven?

_____

End of Block: Sociostructural factors

Start of Block: socio demographics

Q23 Wat is uw leeftijd?

_____

Q24 Wat is uw geslacht?

- ○ Man (1)
- ○ Vrouw (2)
- ○ Ik geef hier liever geen antwoord op (3)

Q25 Wat is uw hoogst voltooide opleiding?

- ○ Geen onderwijs / basisonderwijs/ cursus inburgering / cursus Nederlandse taal (1)
- ○ LBO / VBO / VMBO (kader- of beroepsgerichte leerweg) / MBO 1 (assistentenopleiding) (2)
- ○ MAVO / HAVO of VWO (eerste drie jaar) / ULO / MULO / VMBO (theoretische of gemengde leerweg) / voortgezet speciaal onderwijs (3)
- ○ MBO 2, 3, 4 (basisberoeps-, vak-, middenkader- of specialistenopleiding) of MBO oude structuur (vóór 1998) (4)
- ○ HAVO of VWO (overgegaan naar de 4e klas) / HBS / MMS / HBO propedeuse of WO propedeuse (5)
- ○ HBO (behalve HBO-master) / WO-kandidaats of WO-bachelor (6)
- ○ WO-doctoraal of WO-master of HBO-master / postdoctoraal onderwijs (7)

Q26 Welk van de onderstaande situaties komt het meest overeen met u huidige situatie?

- Ik werk fulltime (1)
- Ik werk parttime (2)
- Ik ben zelfstandig ondernemer/freelancer (3)
- Ik ben werkzoekend (4)
- Ik ben arbeidsongeschikt/ik zit in de ziektewet (5)
- Ik ben gepensioneerd (6)
- Ik studeer (7)
- Ik ben scholier (8)
- Ik ben huisvrouw/-man (9)
- Anders, namelijk: (10) _____

Q27 Wat is uw politieke voorkeur?

	Links	Rechts
Politieke voorkeur ()		

Q39 Heeft u nog op- of aanmerkingen over de vragenlijst?

_____

End of Block: socio demographics