

Interactions between Recreationists at the Utrechtse Heuvelrug

An assessment of the influence of recreationists' dynamics on the level of enjoyment

Regional Integration Project - 2021

Group 2B

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Table of contents

1. Introduction	3
2. Literature review	6
3. Methodology.....	8
4. Results.....	11
5. Discussion	16
6. Conclusion.....	19
7. Relevance and integration possibilities.....	20
8. References	21
Appendix A: Survey	23
Appendix B: Test results.....	25
Appendix C: Druktemonitor	27

1. Introduction

Over the last years, more money has been invested into the Utrechtse Heuvelrug (See Figure 1). This suggests also an increase in visitors. And, since most other options for activities are prohibited with the arrival of Covid-19, the number of visitors increased even more (RTL Nieuws, 2020). Spending time in nature is beneficial for human health (Frumkin et al., 2017); however, it might have an impact on other people and their activity enjoyment. These effects can be both positive and negative. This paper elaborates on the increasing number of interactions between recreationists in the area and the influence on the level of enjoyment.

Due to Covid-19, several organizations helped to develop a tool, the so-called 'Druktemonitor', where the visitors of the Utrechtse Heuvelrug can see what parts of the natural park are busy (See Appendix C). This offers people the option to change their destination or visit the area on another date (Provincie Utrecht, 2020). The 'Druktemonitor' was made because of Covid-19; however, it might still be relevant after the Covid measures have been lifted to improve the experience of recreationists.

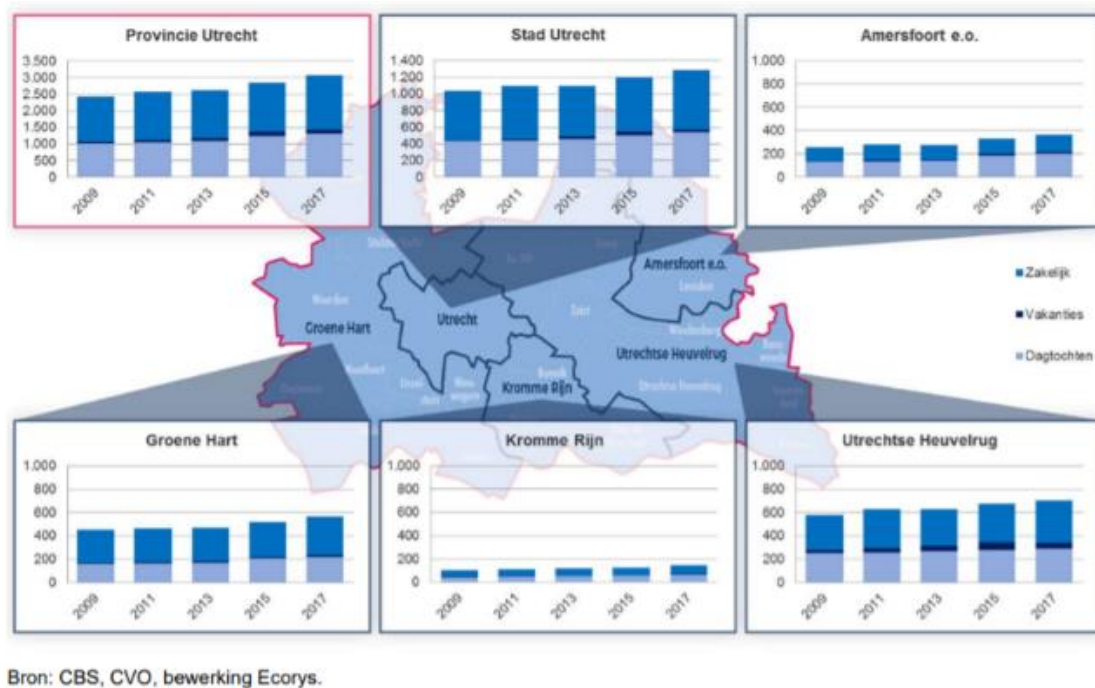


Figure 1: A graphical representation of the expenses of visitors in the Utrechtse Heuvelrug. (Provincie Utrecht, 2019)

With more people visiting the Utrechtse Heuvelrug, more problems are arising in the area. For instance, mountain bike trails are not sufficiently developed, too busy, too short, or not challenging enough; therefore, mountain bikers might create their own paths (Stobbelaar, 2013). More recreationists are coming to the area to exercise in nature. One of the questions that then arises is: Do recreationists doing sports influence the experience of other recreationists? In this research, different categories of recreationists doing sports will be investigated (e.g., joggers, mountain bikers, and horse riders), as well as recreationists not doing sports (e.g., walkers, cyclists).

Our research focuses on two main groups (i.e., recreationists doing sports and recreationists not doing sports) and the subgroups, namely *mountain bikers*, *joggers*, *horse riders*, *walkers*, *dog walkers*, *cyclists*, *families with children*, and *families with children and dog*. The division of the recreationists is also shown in Figure 2. The topic focuses on interactions between different recreationists from the perspective of the two main groups. The reasons behind this are further explained in the Relevance section of this paper.

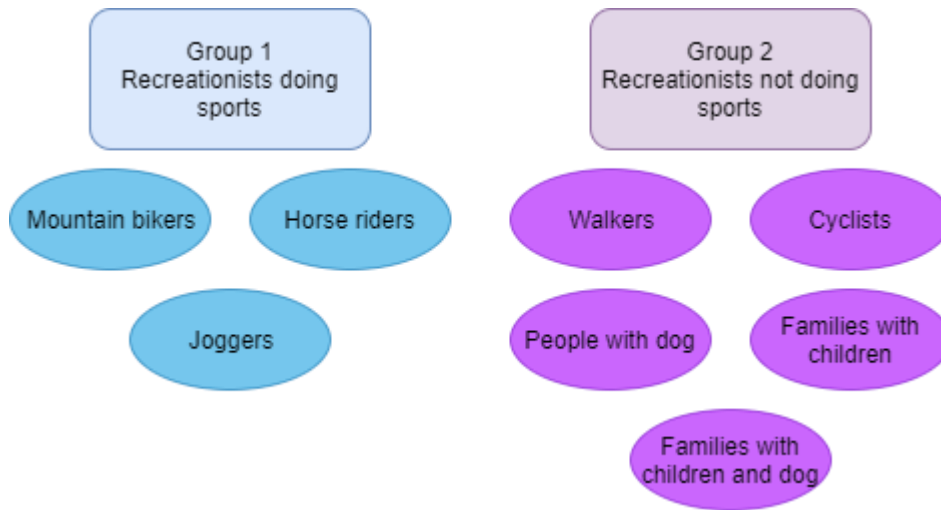


Figure 2: The division of the two main categories and sub-categories of recreationists.

The goal of this research is to answer the following research question and sub-questions, which are shown in Table 1.

Research question
<i>How do interactions between different recreational groups influence the level of enjoyment when visiting the Utrechtse Heuvelrug?</i>
Sub questions
<i>1. How do visitors rate interactions with different activity groups?</i>
<i>2. Is there a significant difference in how the different age groups rate the activity groups?</i>
<i>3. Is there a significant difference in how Group 1 and Group 2 rate the different activity groups?</i>
<i>4. Is there a significant difference in the enjoyment of nature when it is quiet or crowded for different age groups?</i>
<i>5. Is there a significant difference in the enjoyment of nature when it is quiet or crowded for Group 1 and Group 2?</i>

Table 1: The main research question and sub-questions

This research paper aims to analyse the interactions of recreationists doing sports with recreationists not doing sports and the interactions between recreationists in general. Besides this, the research will elaborate on the influence these interactions can have on the level of enjoyment achieved. The data for this research will be obtained through surveys conducted at the Utrechtse Heuvelrug.

2. Literature review

The different experiences of recreationists are, according to Mann and Absher (2008), influenced by physical resource, management, and social attributes. These factors relate respectively to nature and its potential, the human efforts to structure the nature area (e.g., regulation and infrastructure), and the social interactions and attributes (Mann and Absher, 2008). They suggest that these elements of the recreation system affect each other and that every recreational activity influences the entire system (Mann and Absher, 2008). Therefore, recreational conflict can occur because of the dynamics in the system.

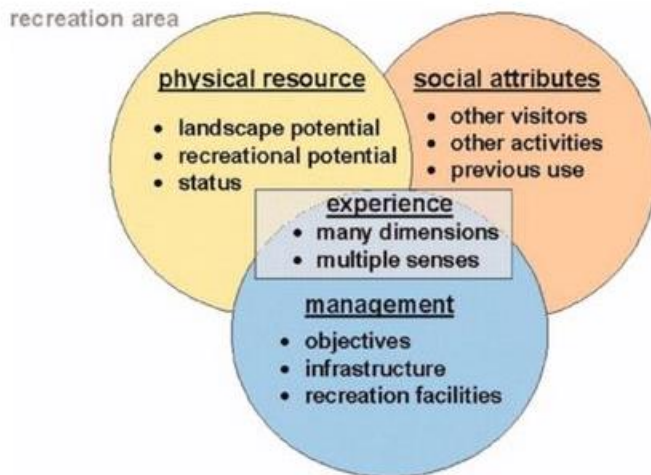


Figure 3: Model of a recreation system by Mann and Absher (2008)

Research has been done on explaining these conflicts and understanding their source. This led to a 'goal-interference' framework by Jacob and Schreyer (1980), which describes four causes for conflict (i.e., activity style, resource specificity, mode of experience and lifestyle tolerance). This framework has later been extended by Mann and Absher (2008), where they added 'expectations' as a fifth variable. Higham and Reis (2009) even moved beyond 'Goal Interference' towards a 'Social Sustainability' framework, in which they included a more in-depth understanding of conflicts using several theories from the field of sociology. Their goal was to better understand the "perceptions and experiences of conflict" from recreationists – which in their case were hunters and hikers on Stewart Island, New Zealand (Highman & Reis, 2009, p. 85).

One reason for conflict to arise is the difference in the impact that certain groups of recreationists can have on nature. An example is a studied conflict between mountain bikers and other recreationists, in which the negative effect of mountain bikers was perceived to be relatively high compared to hikers (Jansen, 2004). It has become clear, however, that the difference between these groups was neglectable (Jansen, 2004.), and that the presence of trails in nature has the largest negative impact on nature, and not per se the usage (Cessford, 1995). Nonetheless, conflicts still arise between different groups of recreationists. This can partly be explained by the fact that the reality differs from people's perceptions about the impact that other recreationists have on nature (Jansen, 2004). However, most conflicts seem to have their roots in the social differences between people. As a study by Reis and Higham (2009) suggests, "conflicts from polarized views will inevitably arise" (p. 104).

One way of mitigating conflict is by zoning, where different types of recreationists are separated into different areas. This has been found to be effective to reduce conflict between motorized and non-motorized recreationists, but less effective at reducing social conflicts between non-motorized recreationists (Miller et al., 2017). Miller et al. (2017) also suggest that active management is needed to educate the different types of non-motorized recreationists, specifically targeted at their attitudes and norms. Other studies also underline the importance of education and information distribution to limit conflicts among recreationists (Jansen, 2004; Mann & Absher, 2008; Reis & Higman, 2009).

Research on the recreationists' social world has been done, of which became clear that differences in motives are what lead to conflicts (Reis and Higham, 2009). Also, the individual social factors mentioned in the framework by Mann and Absher (2008) seem to be important regarding the experiences of recreationists. This research will use some of these factors to categorize the different recreationists: activity style, experience, and tolerance. However, the focus is on the influence recreationists have on the experience of other recreationists, with the main distinction between recreationists doing sports and recreationists not doing sports (referred to as Group 1 and Group 2, respectively, in our research). The experience is expressed in the level of enjoyment.

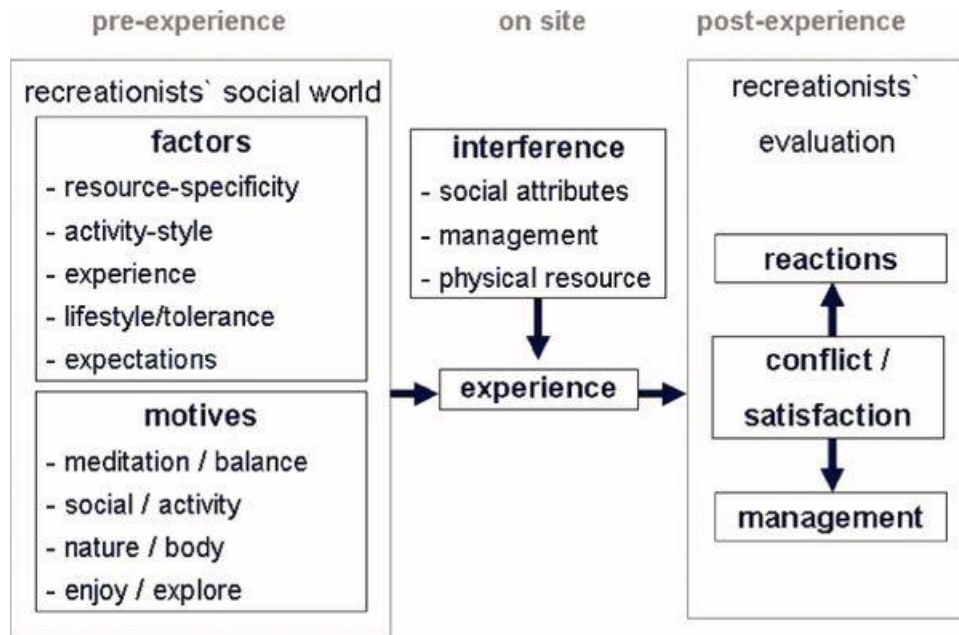


Figure 4: Conflict analysis model by Mann and Absher (2008)

3. Methodology

To answer the research question and the sub-questions, quantitative data will be collected at the location of Utrechtse Heuvelrug from recreationists who spend their time there. The survey will be created in Survey123, which can be filled out on a smartphone. The survey will contain multiple choice and rating scale questions about what recreationists are doing in the area and how their interactions with other groups influence their activity enjoyment. The full survey can be found in Appendix 1.

The data collection will take place on June 1st, 2nd and 3rd during several days of fieldwork. The location where the survey will be conducted is Lage Vuursche, in the Utrechtse Heuvelrug, as requested by the management of the national park. More specifically, at the parking spaces at Parking Kuil van Drakensteyn and at the start of several trails from there. Here, visitors of the Utrechtse Heuvelrug will be approached and asked to fill out the survey.

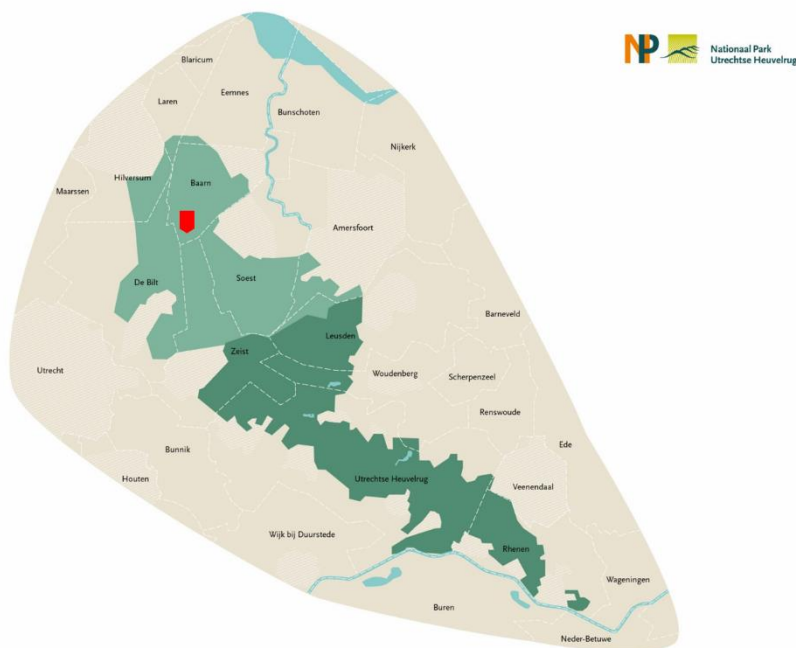


Figure 5: Location Parking Lage Vuursche in National Park Utrechtse Heuvelrug (Nationaal Park Utrechtse Heuvelrug, n.d.)

The collected data will be organized in a spreadsheet both in Excel and SPSS and the answers will be divided into groups based on the two main groups of recreationists, Group 1 and Group 2, and the five age groups (0-34, 35-44, 45-54, 55-64, 65 or older). The age groups have been divided this way so that there are equal respondents per category. Table 2 shows the division of the survey questions by the sub-question they help answer.

The survey question “What do you do in Utrechtse Heuvelrug most often?” will be used to answer all the sub-questions, except for sub-question 4. This survey question and its answers allows for a division by the type of recreational activity and thus also the two main groups of recreationists.

Sub question	Corresponding survey questions
1. <i>How do visitors rate interactions with different activity groups?</i>	- Please rate how the interaction with different groups influences how much you enjoy your activity.
2. <i>Is there a significant difference in how the different age groups rate the activity groups?</i>	- How old are you? - Please rate how the interaction with different groups influences how much you enjoy your activity.
3. <i>Is there a significant difference in how Group 1 and Group 2 rate the different activity groups?</i>	- Please rate how the interaction with different groups influences how much you enjoy your activity.
4. <i>Is there a significant difference in the enjoyment of nature when it is quiet or crowded for different age groups?</i>	- How old are you? - How much do you enjoy nature when it is crowded? - How much do you enjoy nature when it is quiet?
5. <i>Is there a significant difference in the enjoyment of nature when it is quiet or crowded for Group 1 and Group 2?</i>	- How much do you enjoy nature when it is crowded? - How much do you enjoy nature when it is quiet?

Table 2: The five sub-questions and the corresponding survey questions.

To analyse the data for the first sub-question, the descriptive statistics will include the distribution of the activity of the recreationists, the age categories, the recreationists doing sports and not doing sports and the averages and standard deviation of the ratings recreational groups received. These statistics will be visualized using tables to give a clear overview of the data.

	Values	Walkers	Joggers	Mountain Bikers	Etc.
Total	Mean	x	x	x	
	Std. Deviation	x	x	x	

Table 3: An example of a table for the descriptive statistics of the ratings the activities received from all respondents.

To answer the second sub-question about the age groups, data from the corresponding survey question “Please rate how the interaction with different groups influence how much you enjoy your activity” will be analysed using a Kruskal Wallis test in SPSS. This test can be used to determine if there is a variance between the ratings given to the activity groups by the age categories. If the result of this test gives a significant difference, a Mann-Whitney U test will be done to examine which groups exactly gave different ratings. This test can be used to examine the differences between two groups when the variable, in this case, the rating of experiences with other recreationists, is on an ordinal scale. Once those groups have been identified, the means will show how the ratings vary. Both the means and the significance for different ages will be visualized in two tables for each main category.

To analyse the data for the third sub-question, several Mann-Whitney U tests will be conducted using SPSS. The test will compare the ratings for the activities between Group 1 and Group 2. Similar to the sub-question regarding the age categories, if there is a significant difference between ratings, the means will

show how they differ. This will help further understanding the dynamics between different groups of recreationists.

Activity	Sig.
Walkers	x
Joggers	x
Mountain bikers	x
Etc.	

Table 4: An example of the table for sub-question “Is there a significant difference between how Group 1 and Group 2 rate the different activity groups?”.

Finally, for sub-question 4 and 5, the two survey questions “How much do you enjoy nature when it is crowded?” and “How much do you enjoy nature when it is quiet?” will be analysed for both the age categories and the recreational groups. To start it will be determined if there is a difference between the ratings for “quiet” and “crowded” in general by using the Wilcoxon Signed Ranks test. This test can be used to compare two samples and their means to see if there is a difference. It is a substitute for the T-test if the data is not normally distributed, which is how the data for “quiet” is distributed (see Appendix B). The result of this test will be entered in a table that will display the counts of the ratios between “crowded” and “quiet” and the significance.

	Count	Asymp. Sig. (2-tailed)
Crowded < Quiet	x	
Crowded > Quiet	x	
Crowded = Quiet	x	
Total	x	x

Table 5: An example of the table for the Wilcoxon signed ranks test analysis.

After this test, a Kruskal-Wallis test can be conducted to see if there is a difference between the ratings from the age groups and between the ratings from Group 1 and Group 2. If the result from the Kruskal-Wallis test shows that there is a significant difference, a Mann-Whitney U test will be done to further examine where this difference is situated. The results of these tests will be visualized in a table using the p-value.

4. Results

During the fieldwork days, a total of 122 recreationists agreed to be surveyed and the results have been described and analysed. Unfortunately, it was not possible to conduct fieldwork during the weekend due to a possible Covid-infection among one of the students. Still, relevant data has been collected. The results answer our research question: *How do interactions between different recreational groups influence the level of enjoyment when visiting the Utrechtse Heuvelrug?*. Several tests were used to analyse the data, examples of these tests can be found in Appendix B.

The following division of activities was found:

Category	Count	Percentage
Walkers	88 respondents	72.1%
Mountain bikers	18 respondents	14.8%
Cyclists	14 respondents	11.5%
Horse riders	1 respondent	0.8%
Joggers	1 respondent	0.8%

Table 6: The division of surveyed recreationists.

The following division of age was found:

Age group	Count	Percentage
34 or younger	24 respondents	19.7%
Between 35-44	23 respondents	18.9%
Between 45-54	26 respondents	21.3%
Between 55-64	25 respondents	20.5%
65 or older	24 respondents	19.7%

Table 7: The division of age groups.

The following division of recreationists doing sports and recreationists not doing sports was established:

Recreational groups	Count	Percent
Doing sports (Group 1)	20	16.4
Not doing sports (Group 2)	102	83.6
Total	122	100

Table 8: The count and percentage of Group 1 and Group 2.

Sub question 1: *How do visitors rate interactions with different activity groups?*

To analyse the ratings given to each activity, the means were calculated. The mean for each category shows how the category is rated by the total sample size, on a scale of 1 to 5 (see Table 9). This shows that in general, interactions with mountain bikers received the lowest average rating (2.73), and interactions with walkers received the highest average rating (3.72). It is also noticeable that the mean for families with children is relatively high (3.66).

	Values	Walkers	Joggers	Mountain Bikers	Bikers	Horse Riders	Families with Children	Bootcampers	People with dogs
Total	Mean	3.72	3.35	2.73	3.07	3.45	3.66	3.48	3.43
	Std. Deviation	0.973	0.926	1.227	1.018	0.901	0.943	0.815	1.128

Table 9: The means and standard deviation of the ratings given to the activity groups by all the respondents.

Sub question 2: *Is there a significant difference between how the different age groups rate the activity groups?*

A Kruskal-Wallis test was conducted to determine if there was a significant difference between the ratings different age groups gave activities. For the Kruskal-Wallis test, the null hypothesis is that there is no significant difference between the age groups. The hypothesis is that there is a significant difference between the age groups. The results of this test show that for both walkers and people with dogs, the significances are lower than 0.05. So, the null hypothesis can be rejected; thus, there is a significant difference in how the various age categories rate the activity groups.

Activity	Sig.
Walkers	0.037
Joggers	0.987
Mountain Bikers	0.539
Bikers	0.399
Horse Riders	0.449
Families with Children	0.063
Boot Campers	0.391
People with Dogs	0.005

Table 10: Results of the Kruskal-Wallis test of the differences in rating given to the activity groups by the different age categories.

Several Mann-Whitney U tests were conducted to determine which age groups rated both walkers and people with dogs differently. For walkers, the p-values of '65 and older' compared to all other age categories are lower than 0.05, indicating a significant difference (see Table 10). All the other significances are higher than 0.05. The means in Table 13 show that the group '65 and older' rate walkers significantly higher with an average rating of 4.21 on a scale from 1 to 5. Especially compared to the group '35-44' which has a mean of 3.35.

	34 and younger	35-44	45-54	55-64	65 and older
34 and younger	-	0.263	0.785	0.966	0.029
35-44	-	-	0.140	0.301	0.006
45-54	-	-	-	0.857	0.023
55-64	-	-	-	-	0.049
65 and older	-	-	-	-	-

Table 11: Results from the Mann-Whitney U tests for the differences in ratings from the age groups for Walkers.

For people with dogs, the significances of '65 and older' compared to all age categories except '35-44' are lower than 0.05 (see Table 12). Additionally, the significance for '34 and younger' and '35-44' is also below 0.05. This means that for these groups, there is a significant difference in rating the people with dogs. Comparing the means in Table 13, it becomes clear that the group of '65 and older' rates people with dogs significantly lower compared to the groups 34 and younger, 45 till 54 and 55 till 64. The 34 and younger rates people with dogs significantly higher than the group 35 till 44, a mean of 3.96 compared to 3.09.

	34 and younger	35-44	45-54	55-64	65 and older
34 and younger	-	0.010	0.123	0.098	0.002
35-44	-	-	0.079	0.165	0.600
45-54	-	-	-	0.788	0.013
55-64	-	-	-	-	0.042
65 and older	-	-	-	-	-

Table 12: Results from the Mann-Whitney U tests for the differences in ratings from the age groups for People with Dogs.

Age Groups	Values	Walkers	Joggers	MountainBikers	Bikers	Horse Riders	Families with Children	Bootcampers	People with dogs
34 and younger	Mean	3.67	3.33	2.92	3.08	3.25	3.79	3.62	3.96
	Std. Deviation	0.868	1.049	1.060	0.881	0.847	1.062	0.770	1.122
35-44	Mean	3.35	3.30	2.91	3.17	3.74	3.91	3.26	3.9
	Std. Deviation	1.071	1.063	1.345	0.937	1.096	0.949	0.964	1.164
45-54	Mean	3.73	3.38	2.77	3.19	3.42	3.73	3.50	3.62
	Std. Deviation	0.724	0.752	1.275	0.981	0.901	0.604	0.762	0.941
55-64	Mean	3.64	3.40	2.36	2.72	3.40	3.16	3.44	3.52
	Std. Deviation	1.075	0.913	1.114	0.980	0.707	0.987	0.768	1.046
65 and older	Mean	4.21	3.33	2.71	3.17	3.46	3.71	3.54	2.92
	Std. Deviation	0.977	0.917	1.334	1.274	0.932	0.955	0.833	1.139

Table 13: The means and standard deviation of the ratings given to the activity groups by the different age categories.

Sub question 3: *Is there a significant difference between how Group 1 and Group 2 rate the different activity groups?*

In Table 15, the mean is also calculated separately on each activity for Group 1 and Group 2. The significances of these results are tested with a Mann-Whitney U Test. This test has been conducted to compare the ratings given by the main groups of recreationists to the individual recreational activities. The null hypothesis for this test is the following: There is no significant difference between the ratings given by the groups.

For every recreational activity, significance is calculated. The results show that for mountain bikers and people with dogs, the p-value is lower than 0.05 (0.001 and 0.004 respectively, see Table 14). Therefore, the null hypothesis can be rejected for these groups. This means that Group 1 and Group 2 gave mountain bikers and people with dogs a significantly different rating. For all other activities, the significance was higher than 0.05 and therefore the null hypothesis cannot be rejected. This means that there is no significant difference in the ratings that Group 1 and Group 2 gave to people doing these activities.

Recreational activity	Sig.
Walkers	0.491
Joggers	0.103
Mountain Bikers	0.001
Bikers	0.502
Horse Riders	0.865
Families with Children	0.355
Boot Campers	0.129
People with Dogs	0.004

Table 14: Results Mann-Whitney U test of difference in rating between Group 1 and Group 2.

The means below show that mountain bikers are rated significantly lower by Group 2 than by Group 1, 2.56 and 3.60 respectively. For people with dogs, Group 1 gave a significantly lower rating compared to Group 1, 2.75 and 3.56 respectively.

Sports or not	Values	Walkers	Joggers	Mountain Bikers	Bikers	Horse Riders	Families with Children	Bootcampers	People with dogs
Doing Sports (Group 1)	Mean	3.55	3.65	3.60	3.25	3.40	3.40	3.20	2.75
	Std. Deviation	1.099	1.089	1.231	1.020	1.095	1.142	0.951	1.209
Not doing sports (Group 2)	Mean	3.75	3.29	2.56	3.03	3.46	3.71	3.53	3.56
	Std. Deviation	0.949	0.885	1.157	1.019	0.864	0.897	0.780	1.068

Table 15: The results from the descriptive statistics including the mean, count and standard deviation.

Sub question 4: *Is there a significant difference between the enjoyment of nature when it is quiet or crowded for different age groups?*

To determine if there is a general difference in enjoyment between quiet and crowded, a Wilcoxon Signed Ranks Test was conducted. The significance of this test is 0.000, which is lower than 0.05, and therefore, the enjoyment of nature is significantly higher when it is quiet (see Table 16). The Wilcoxon Signed Ranks test showed that in our sample, 104 people enjoy a quiet nature area more than a crowded nature area and 3 respondents preferred it the other way around. For 15 respondents, the level of enjoyment was not dependent on how quiet or crowded the area is. Thus, a significantly higher amount of people enjoy nature more when it is quiet than when it is crowded, which is a logical result.

	Count	Sig.
Crowded < Quiet	104	
Crowded > Quiet	3	
Crowded = Quiet	15	
Total	122	0.000

Table 16: Results of the Wilcoxon Signed Ranks test for the difference in ratings between quiet and crowded.

A Kruskal-Wallis test was performed to test if the various age groups rate their enjoyment in nature when it is quiet and crowded at Utrechtse Heuvelrug differently. The significances of both when nature is quiet and crowded are above 0.05 (see Table 17), so there is no valid difference in the ratings.

Quiet or Crowded	Sig.
Quiet	0.249
Crowded	0.269

Table 17: Results of the Kruskal-Wallis test of the differences between the age groups and the ratings for quiet and crowded.

Sub question 5: *Is there a significant difference between the enjoyment of nature when it is quiet or crowded for Group 1 and Group 2?*

To answer this sub-question, another Kruskal-Wallis test was conducted. The significance of 'crowded' is 0.913, which is higher than 0.05 (see Table 18). This means that there is no important difference in how Group 1 and Group 2 enjoy nature when it is crowded. The significance of 'quiet' is 0.037 and lower than 0.05, meaning that there is a significant difference in how Group 1 and Group 2 enjoy nature when it is quiet. The means are represented in Table 19 and show that Group 1 rates the enjoyment of nature when it is quiet significantly higher than Group 2, with a 5 and a 4.75 respectively.

Quiet or Crowded	Sig.
Quiet	0.037
Crowded	0.913

Table 18: Results of the Kruskal-Wallis test of the differences between Group 1 and Group 2 for quiet and crowded.

Recreational group	Quiet or Crowded	Mean
Doing sports (Group 1)	Quiet	5
	Crowded	3
Not doing sports (Group 2)	Quiet	4.75
	Crowded	2.97

Table 19: The mean of the ratings for nature when it is quiet and crowded given by Group 1 and Group 2.

5. Discussion

This research tried to answer the question: *How do interactions between different recreational groups influence the level of enjoyment when visiting the Utrechtse Heuvelrug?* A survey has been used to gather data on the opinions and experiences of visitors of the Utrechtse Heuvelrug. To answer the main question, several sub-questions were raised, which tried to paint a broader picture of the different point of views and all together help answer the main question.

The results of the sub-question *'How do visitors rate interactions with different activity groups?'* show that, in general, people rated interactions with other recreationists relatively positive. However, the mountain bikers and cyclists scored comparably low (i.e., 2.56 and 3.03 respectively) and the walkers and families with children high (i.e., 3.75 and 3.71 respectively). These values show the general opinion of visitors on different types of recreationists. The relatively negative opinion on mountain bikers is a returning concept, as also other studies have shown this (e.g., Jansen, 2004). However, on the Utrechtse Heuvelrug, this has not yet been studied and it is, therefore, an interesting result to the park management. Although the perceptions that people have of mountain bikers and their impact on nature are not in line with reality, people in general still do not like the interactions with them (Jansen, 2004). The speed and surprise of the interaction could be an explanation of the low score for the mountain bikers, as well as for the cyclists; however, this could be studied more thoroughly in the future. Furthermore, since recreationists enjoy nature more when it is quiet compared to crowded, this suggests that in general, the visitors would prefer a lower number of interactions over a high number.

The results of the sub-question *'Is there a significant difference in how different age groups rate the activity groups?'* show that there is indeed a valid difference between the ratings of walkers and people with dogs, but not for the other categories. The walkers are rated significantly higher by the age group 65 and above. Moreover, this age group rates people with dogs significantly lower compared to the other age groups, except for the age group 35 till 44. This age group of 35 till 44 also rates people with dogs relatively low and compared with the group younger than 35, the given rating is even significantly lower.

The results for the sub-question *'Is there a significant difference between how Group 1 and Group 2 rate the different activity groups?'* show that people not doing sports rate mountain bikers significantly lower and that people doing sports rate people with dogs significantly lower. People not doing sports rated walkers and families with children highest, while people doing sports rated joggers and mountain bikers highest. Even though these last results make sense, they are not significant and therefore, conclusions cannot be drawn from them. In short, the answer to the sub-question is that there is an important difference between how various activity groups are rated by Group 1 and Group 2. Jansen (2004) showed that mountain bikers affected the experience of recreationists more negatively than hikers. This complements the results of this research. For all the other activity groups except for mountain bikers and people with dogs, there is no difference in how they are rated by Group 1 and Group 2.

The analysis for sub-question *'Is there a significant difference in the enjoyment of nature between when it is quiet or crowded for different age groups?'* shows that there is a significant difference between the total average ratings for quiet and crowded: 104 respondents out of the 122 rated a quiet nature area higher than a crowded nature area. The analysis for the difference between the age groups and their ratings of quiet and crowded areas showed that there is no important distinction. Therefore, the age categories do not rate the two situations significantly different.

The results for the sub-question *'Is there a significant difference in the enjoyment of nature between when it is quiet or crowded for Group 1 and Group 2?'* show that there is a difference in enjoyment when it is quiet, but not when it is busy. In general, when it is quiet, people doing sports (Group 1) enjoy nature more than people not doing sports (Group 2). Interestingly, the experience of athletes in the area seems to be relatively dependent on the quietness of the area, while one would expect it would be mostly dependent on the activity itself. However, without further research, conclusions should not be drawn from this, since this research did not investigate the motives of recreationists. The results also show that in a crowded situation, both groups seem to have a lower level of enjoyment in nature compared to when it is quiet, but there is no significant difference between the two groups' ratings.

The impact other recreationists can have on someone's experience relates closely to the social attributes of the recreation system by Mann and Absher (2008). They showed that this interactive system is dependent on three main factors: management, physical resource and social attributes. These factors influence both one another and the system as a whole (Mann and Absher, 2008). Thus, this interactivity shows the complexity of issues related to certain aspects of this system (e.g., infrastructure or other visitors).

Fitting such complex issues - in this case, related to the social interactions of recreationists - into research has shown to be a challenge. For example, the division of different activity groups into Group 1 and Group 2 ended up being different than anticipated because the surveyed cyclists were not people doing sports, but rather people having a relaxing ride through the forest on an (e-)bike. Looking back, a division should have been made between cyclists doing sports and people biking (not doing sports). Nevertheless, it was decided to put them all in Group 2, not doing sports. This has had an impact on the research, since the group of people doing sports became smaller, and the other group larger. This is unfortunate since Group 1 was already relatively small. This can partly be explained by the difficulties regarding stopping and surveying athletes, as well as the fact that they were represented in lower numbers at the national park. Or to put it differently, at the Utrechtse Heuvelrug (more specifically, Lage Vuursche) there seem to be more people not doing sports (mainly walking) than people doing sports, as the results also showed. This statement can be either complemented or complicated by the results of group 2A, which are doing research on the inventory of visitors. A future improvement would be to use another method of sampling, namely stratified random sampling. For this form of sampling, the population is categorised into strata, and then random selection takes place in each stratum (Bryman, 2016). Using stratified random sampling would make sure that there are enough people represented of each activity group. Although the sample size in general, and especially of people doing sports, was relatively small, the results are still relevant and give a good impression of the different opinions.

Furthermore, this research mainly focused on the opinion people have and can contribute to a general idea of the public opinion of visitors of the Utrechtse Heuvelrug. However, the reasons behind these opinions could be studied more closely, since these are factors that have not been considered. This relates for example to the motives people might have and the differences in these that can cause conflict. Also, research has shown that also other aspects of the recreational system can have quite an impact on the level of enjoyment achieved (Jansen, 2004; Reis and Higham, 2009; Mann and Absher, 2008). For example, the management implementations of spatial and temporal distribution can help decrease conflict (Mann and Absher, 2008; Miller et al., 2017).

The fact that the data collection process consisted mostly of asking the questions orally might have caused bias. Especially because many different students were conducting the surveys. Also, many respondents struggled to give the answer that was being asked for (e.g., answering according to the Likert Scale for rating other recreationists). This problem was time-consuming and increased the chances of bias.

It is interesting to mention that although there are differences between the ratings, in general, most recreationists rate the interactions with others relatively positive. This is something, as also stated by Jansen (2004), that should not be forgotten: often, the dramatic and negative interactions seem to be remembered, while most interactions are without any conflict and generally do not have a negative impact on people's enjoyment.

6. Conclusion

The respondents of the survey mostly consisted of walkers, mountain bikers, and bikers. The recreational activities that received the lowest average ratings from the respondents of the survey were mountain bikers, while the highest average rating was given to walkers. Noticeably, people with dogs also received a low average rating from Group 1 compared to Group 2. The two groups of mountain bikers and people with dogs are the only recreational activities that had a significant difference in the ratings given by Group 1 and Group 2. Investigating why Group 2 is especially negatively influenced by mountain bikers and why Group 1 is negatively influenced by people with dogs could be interesting for further research. The results showed that the 65+ age group rated walkers significantly higher and people with dogs significantly lower.

The data showed that there is a difference between the level of enjoyment of nature when it is quiet or crowded. When it is quiet in nature, the average rating was higher than when it is crowded. Furthermore, the results showed that there is no significant difference between how the age groups rated a quiet and crowded area. However, there is a significant difference between Group 1 and 2 and their ratings of nature when it is quiet: Group 1 rated it significantly higher than Group 2.

In conclusion, interactions between recreationists influence their level of enjoyment when visiting the Utrechtse Heuvelrug. This is important to keep in mind when making and implementing policies. Research suggests that it is of great importance to have a good distribution in space and time between the different groups (Miller et al., 2017; Mann and Absher, 2008). This research shows that this can be especially helpful to reduce interactions between people not doing sports and mountain bikers and between people doing sports and people walking their dogs. However, the most important solutions suggested do relate to education and information efforts (Miller et al., 2017; Jansen, 2004; Mann and Absher, 2008; Reis and Higman, 2009). These can include for example the 'Druktemonitor', to provide people with more information on the crowdedness; a suggestion could be to further expand this and add the different activities that people are doing. Even more, the results show that the 'Druktemonitor', which was set up due to Covid-19 measures, should stay active even after the regulations are lifted. Although the results of this research cannot simply be extrapolated to all other recreation areas due to its relatively small sample size and specific time and location, management of other areas could keep the results in mind. For example, since people seem to prefer fewer interactions, the concept of the 'Druktemonitor' could be adopted by other park managements.

7. Relevance and integration possibilities

Many people visit the Utrechtse Heuvelrug every day. This implies that each day recreationists interact with each other. These interactions can influence their experience to a certain extent (Mann and Absher, 2008; Reis and Higman, 2009). This research aims to find out if interactions also influence their level of activity enjoyment, and to what extent. Performing research on how other interactions can influence a person's level of enjoyment is relevant because it could explain people's visiting behaviours. For example, people might avoid certain hours or days to avoid crowds or choose to do a different activity.

There have been several studies on mountain bikers on the Utrechtse Heuvelrug, and how the mountain bike trails should be adjusted to avoid conflict between mountain bikers and other recreationists (e.g., Hoofwijk & Stobbelaar, 2013; Doorn et al., 2011). However, firstly, in our research area of Lage Vuursche, the mountain bike trails have been renovated in 2017/2018 (Lage Vuursche, sd). Therefore, it is unsure if the previous research is still relevant. Secondly, there is little research on other types of recreationists and their dynamics. Studying these groups as well might lead to important information that could be valuable to the Utrechtse Heuvelrug.

Social stability in a well-known area such as the Utrechtse Heuvelrug is important. With the results of this research, the management of the national park will know how important these interactions are, and if needed, how to improve the area socially (e.g., more/less separated paths, more meeting places). To improve social stability, research on possible friction between recreationists needs to be fulfilled. Additionally, this research aims to better understand the behaviour of different recreationists, their age groups, and their dynamics, which can be helpful for park management.

The province of Utrecht now offers the 'Druktemonitor', which shows how crowded it is in the Utrechtse Heuvelrug. With this research, the hope is to discover if it would be purposeful if people also could see what kind of recreationists are present at that time and in what numbers. Also, the 'Druktemonitor' is especially important in these times because of Covid-19. After the pandemic, when people are less discouraged to visit busy places, the 'Druktemonitor' might lose its value. This research can serve as an extension and justification of the 'Druktemonitor', even when the coronavirus is under control. It will show whether it is still relevant to visitors to be able to consider how busy it is before choosing to visit the area and, therefore, whether this tool should still be actively used.

To create a better understanding of the situation in the Utrechtse Heuvelrug more research on the number of visitors is necessary. Research such as the one of group 2A could complement this research. To implement solutions, it is important to see the whole picture rather than just the interactions. This also makes research on the perception of nature, as done by group 2C, an interesting addition to this research.

8. References

- Bryman, A. (2016). *Social Research Methods*. Oxford University Press.
- Cessford, G. (1995). *Off-road impacts of mountain bikes: A review and discussion* (No. 92). Wellington: Department of Conservation. <http://www.doc.govt.nz/Documents/science-and-technical/sr92.pdf>
- Doorn, R., Strikwerda, R., Os, L. v., Prins, A., Hoofwijk, H., Jacobs, J., & Heijman, W. (2011). Wat zijn gebruikers bereid te betalen? Uitbreiding mountainbikeroutes Utrechtse Heuvelrug. *Landschap: Tijdschrift voor landschapsecologie en milieukunde* 28, 121-129.
- Druktemonitor. (2020). Druktemonitor Utrecht. <https://www.druktemonitorutrecht.nl/kaart/>
- Frumkin, H., Bratman, G. N., Breslow, S. J., Cochran, B., Kahn Jr, P. H., Lawler, J. J., . . . Wood, S. A. (2017). Nature Contact and Human Health: A Research Agenda. *Environmental Health Perspectives Vol. 125 No. 7*.
- Ives, C. D., Abson, D. J., von Wehrden, H., Dorninger, C., Klaniecki, K., & Fischer, J. (2018). Reconnecting with nature for sustainability. *Sustainability Science*, 13(5), 1389–1397. <https://doi.org/10.1007/s11625-018-0542-9>
- Jacob, G. R. and Schreyer, R. 1980. Conflict in outdoor recreation: a theoretical perspective. *Journal of leisure research*, 12(4): 368–380. <https://doi.org/10.1080/00222216.1980.11969462>
- Jansen, P. (2004). *Schade en overlast door mountainbikers perceptie of realiteit?* Stichting Probos. <http://edepot.wur.nl/89786>.
- Lage Vuursche. (sd). Opgehaald van MTB Utrechtse Heuvelrug: <https://mtb-utrechtseheuvelrug.nl/mtb-routes/lagevuursche/>
- Mann, C., & Absher, J. D. (2008). Recreation conflict potential and management implications in the northern/central black forest nature park. *Journal of Environmental Planning and Management*, 51(3), 363–380. <https://doi.org/10.1080/09640560801979527>
- Miller, A. D., Vaske, J. J., Squires, J. R., Olson, L. E., & Roberts, E. K. (2017). Does zoning winter recreationists reduce recreation conflict? *Environmental Management*, 59(1), 50–67. <https://doi-org.proxy.library.uu.nl/10.1007/s00267-016-0777-0>
- Nationaal Park Utrechtse Heuvelrug (n.d.). *Over ons*. Nationaal Park Utrechtse Heuvelrug. <https://www.np-utrechtseheuvelrug.nl/stichting-npuh/>
- Provincie Utrecht. (2019, juli). *Monitor toerisme en recreatie provincie Utrecht 2018*. Ecorys. <https://www.provincie-utrecht.nl/sites/default/files/2020-07/Monitor%20Toerisme%20provincie%20Utrecht%202018.pdf>
- Provincie Utrecht, Routebureau Utrecht, Utrecht marketing, VRU, RBU, Utrecht region. (2020, september). *Evaluatierapport druktemonitor*. https://routebureau-utrecht.nl/wp-content/uploads/2020/10/Infographic_druktemonitor-utrecht_evaluatie.pdf

- Reis, A. C., & Higham, J. E. S. (2009). Recreation conflict and sport hunting: moving beyond goal interference towards social sustainability. *Journal of Sport & Tourism*, 14(2-3), 83–107.
<https://doi.org/10.1080/14775080902965025>
- Stobbelaar, D. J. (2013). Mountainbikers op de Utrechtse heuvelrug. *Academia*, 40–41.
https://d1wqtxts1xzle7.cloudfront.net/41958295/Mountainbikers_op_de_Utrechtse_Heuvelrug_20160203-30232-bopkft-with-cover-page.pdf?Expires=1621591654&Signature=L5LjXusRst2pm2CF19~CWMZgzPScDaW90q6CIHOR8WFzbBdcABNOnhCDc5EwEVvHv2Vlaq10joG2p~Ss-3RRaduf76W9GukDQj7mbdofquf~8wIEHk1OQB-QaGRRNfjLgpTey-xDCcXEh2rXZNE~E6wGotkqjQmC6yF77Y3F1TCQzDuiJfUpwr6YK2ISbgFDBz--bYMG04Wxwxo7xydBTYt2Wz-maTwXYkkU~DfPIXATuhmYtfvMjd9VJQIPF4r6s6uOqRScRP02fMt7EmVq4F2P-OZpq5-1KmIS0qnD4j1cezU7tgtvzfSFVcZhp6YmLnynD9DD0l8PvYLcaWrrZQ__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA
- Townsend, M. (2006). Feel blue? Touch green! Participation in forest/woodland management as a treatment for depression. *Urban Forestry & Urban Greening*, 5(3), 111–120.
<https://doi.org/10.1016/j.ufug.2006.02.001>

Appendix A: Survey

Dear survey taker,

We are students from the Utrecht University and are conducting research on the interactions between different types of recreationists and how it influences their levels of activity enjoyment and their perceptions of nature. This survey is anonymous, this means that you cannot withdraw after finishing it. Our final research report will be shared with the National Park of Utrechtse Heuvelrug, and they will have the possibility to publish it.

Thank you for filling out this survey!

1. How old are you?
 - ☐ 18 and under
 - ☐ 18-24
 - ☐ 25-34
 - ☐ 35-44
 - ☐ 45-54
 - ☐ 55-64
 - ☐ 65 and over

2. What do you do in Utrechtse Heuvelrug most often?
 - ☐ Walking
 - ☐ Cycling
 - ☐ Mountain biking
 - ☐ Jogging
 - ☐ Horse riding
 - ☐ Other, please specify...

3. If you filled in walking, who are you with most often?
 - ☐ With children.
 - ☐ With a dog.
 - ☐ Both.
 - ☐ Neither.

4. Please rate how the interaction with different groups influence how much you enjoy your activity.

1 = Very negative influence

2 = (Slightly) negative influence

3 = Neutral (no influence)

4 = (Slightly) positive influence

5 = Very positive influence

Hikers/walkers	1	2	3	4	5
Joggers/runners	1	2	3	4	5
Mountainbikers	1	2	3	4	5
Cyclists	1	2	3	4	5
Horse riders	1	2	3	4	5
Families with children	1	2	3	4	5
People with dogs	1	2	3	4	5

5. How much do you enjoy nature when it is quiet? *Please rate from 1 to 5, 1 = enjoying it very little and 5 = enjoying it very much.*

1 2 3 4 5

6. How much do you enjoy nature when it is crowded? *Please rate from 1 to 5, 1 = enjoying it very little and 5 = enjoying it very much.*

1 2 3 4 5

Data management plan

The data will be collected through Survey123 at the location of Utrechtse Heuvelrug. The survey will be available in Dutch and English and can be filled out on a smartphone or on paper, if necessary.

The survey is anonymous, and because of this, it is not possible to withdraw once the survey is completed.

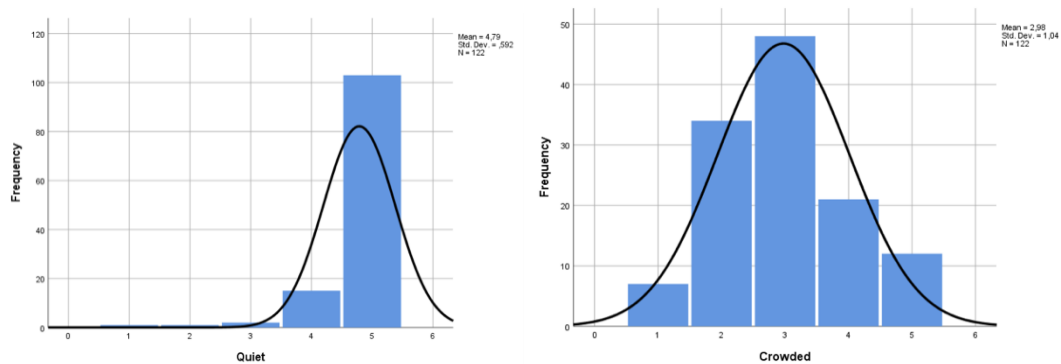
The collected data will be stored on our Survey123 account. Only the group members will have access to this data.

During our research period, we will organize and analyse the collected data in various ways mentioned in the Methodology of this paper. After the end of the research period, all data will be deleted.

The analysed data will be included in the research paper. The National Park of Utrechtse Heuvelrug will have access to the final research paper and will have the right to publish it.

Appendix B: Test results

Distribution of the 'quiet' and 'crowded' data



Two examples of a non-significant (Walkers) and a significant (Mountain bikers) Mann-withney U test.

Mann-Whitney Test

Ranks				
	Sports or not	N	Mean Rank	Sum of Ranks
Walkers	not doing sports	102	62,43	6368,00
	doing sports	20	56,75	1135,00
	Total	122		

Test Statistics^a

Walkers	
Mann-Whitney U	925,000
Wilcoxon W	1135,000
Z	-,688
Asymp. Sig. (2-tailed)	,491

a. Grouping Variable: Sports or not

Mann-Whitney Test

Ranks				
	Sports or not	N	Mean Rank	Sum of Ranks
Mountainbikers	not doing sports	102	56,96	5809,50
	doing sports	20	84,68	1693,50
	Total	122		

Test Statistics^a

Mountainbikers	
Mann-Whitney U	556,500
Wilcoxon W	5809,500
Z	-3,303
Asymp. Sig. (2-tailed)	,001

a. Grouping Variable: Sports or

Example of a Kruskal-Wallis test:

Kruskal-Wallis Test

Ranks			
	Age groups	N	Mean Rank
Quiet	0-34	23	55,61
	35-64	75	61,84
	65 and older	24	66,08
	Total	122	

Test Statistics^{a,b}

Quiet	
Kruskal-Wallis H	2,645
df	2
Asymp. Sig.	,266

a. Kruskal Wallis Test

b. Grouping Variable:
Age groups

Example of a Wilcoxon signed rank test:

Wilcoxon Signed Ranks Test

		Ranks		
		N	Mean Rank	Sum of Ranks
Crowded - Quiet	Negative Ranks	104 ^a	54,15	5631,50
	Positive Ranks	3 ^b	48,83	146,50
	Ties	15 ^c		
	Total	122		

a. Crowded < Quiet

b. Crowded > Quiet

c. Crowded = Quiet

Test Statistics^a

	Crowded - Quiet
Z	-8,648 ^b
Asymp. Sig. (2-tailed)	,000

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

Appendix C: Druktemonitor

Screenshot of what the Druktemonitor looks like. (Druktemonitor, 2020)

