

EARTHQUAKES AND PLACE ATTACHMENT IN LOPPERSUM

The effect of earthquakes on place attachment of the inhabitants of Loppersum



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Colophon

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Abstract

In the province of Groningen there is a problem with human-induced earthquakes. Loppersum is often mentioned as the epicentrum of these earthquakes. The population faces several impacts due to the earthquakes. Economic, environmental and mental problems. According to previous research, earthquakes do not influence place attachment. This paper investigates if this statement is also true for Loppersum, using a quantitative study. The study shows that these findings are also valid for Loppersum.

This research shows that earthquakes affect the house level of place attachment, but not the village level of place attachment. Showing that Loppersum does not differ from the rest of Groningen. Although there are some differences, the main findings are in line with earlier research.

Keywords: Place attachment, Environmental hazards, Loppersum, Earthquakes, Community resilience

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Introduction

Since 1986 around 2000 earthquakes have happened in Groningen due to gas extraction (KNMI, 2022). This activity has increased and coincides with the amount of gas drilled (Spetzler & Dost, 2017). Due to the reduction in gas extraction, the number of earthquakes in Groningen are reduced (Vlek, 2018), but with the current amount of gas drilled, the number of earthquakes will increase again for the coming decades (Vlek, 2018).

Earthquakes have taken place around Loppersum since 2003 (KNMI, 2003). The map of earthquake risk in Groningen (See figure 1) from the KNMI (2016) shows that Loppersum and the region around it have the highest earthquake risk. Therefore Loppersum is seen by some as the epicenter of the earthquakes in Groningen (Miscovic, 2021). The location of Loppersum in the earthquake region, and the seismic activity, is the reason why Loppersum is selected for the case study.

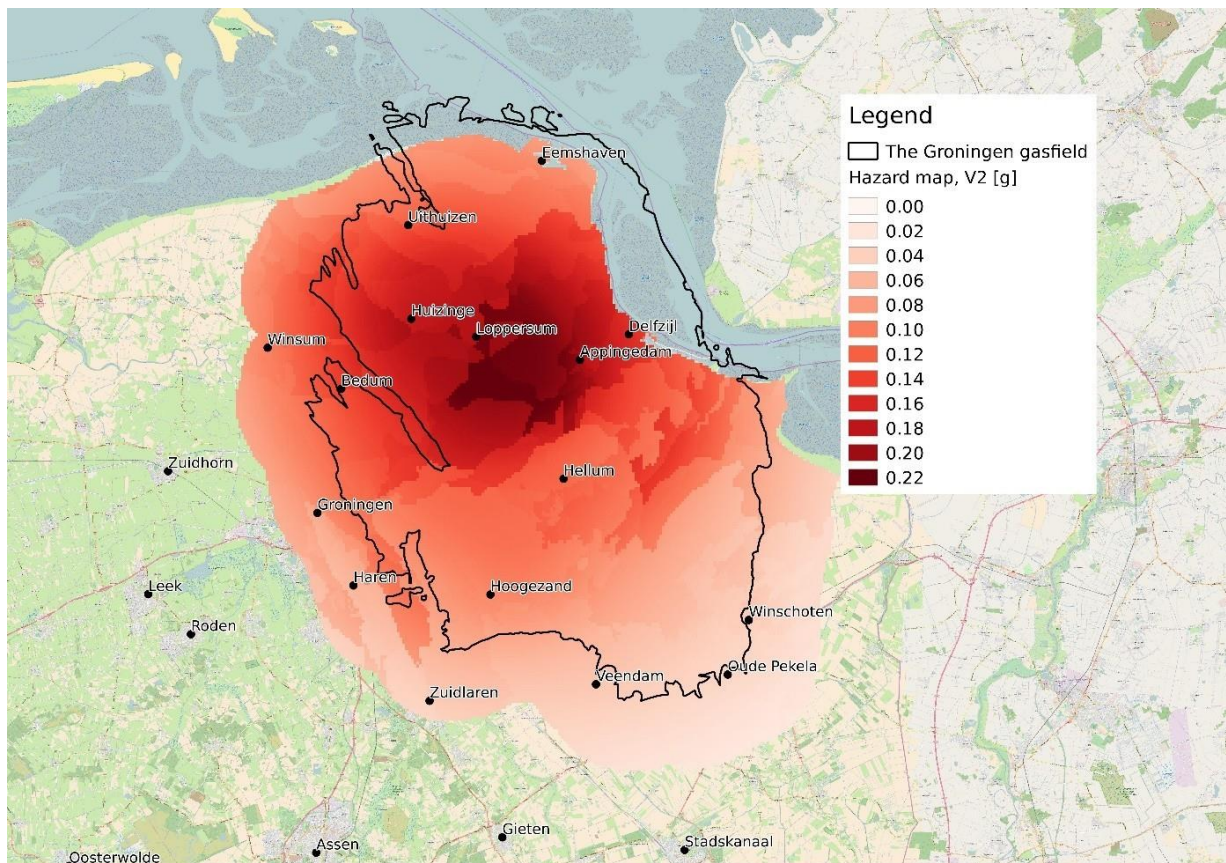


Figure 1: Earthquake risk in Groningen (KNMI, 2016)

The earthquakes in Groningen have several effects on the local population (Postmes, et al., 2020; Stroebe, et al., 2019b; Stroebe, et al., 2022). One of the main problems caused by the earthquakes in Groningen is the damage to houses (Muntendam-Bos & de Waal, 2013). From July until November 2019, there have been around 500 reports of damage every week (Postmes, et al., 2020). The damage can lead to safety risks (Mulder & Perey, 2018), economic problems (Stroebe, et al., 2019b), and harm one's mental health (Stroebe, et al., 2022).

The community of Groningen has shown itself to be resilient during the earthquakes and the problems that followed (Postmes, et al., 2017). They are active, as they feel the need to actively deal with the earthquake problems (Postmes, et al., 2017). The inhabitants demonstrate, sign petitions, and launch legal procedures against the government (Greijdanus & Postmes, 2018).

The government of the Netherlands has decided to stop gas extraction from Groningen because of these problems (NOS, 2018). The gas extraction, however, has not stopped yet (Rijksoverheid, 2022). There is currently an energy crisis (van Gameren, 2022), opening up the discussion about the amount of gas drilled in Groningen (van Gameren, 2022). Therefore, this topic is especially relevant in this day and era.

Research from Postmes, et al. (2020) claims that earthquakes in Groningen negatively affect place attachment to the house. Stroebe, et al. (2019a) have researched the effect of earthquakes in Groningen on the village level of place attachment. The research shows that before 2019, there was a significant difference between people who own damaged houses and those who did not (Stroebe, et al, 2019a). People with damage felt a stronger connection towards the village than those who did not have damaged houses (Stroebe, et al, 2019a). Since 2019, however, this difference is no longer present (Stroebe, et al, 2019a). The aim of this research is to find out if these two claims are true for Loppersum as well.

The central question of the research is:

To what extent do the negative effects of seismic activity affect the feeling of place attachment of the inhabitants of Loppersum?

This question will be answered using three sub-questions:

1. What are the main effects people experience due to hazards?
2. To what extent do people feel attached to Loppersum?
3. What are the effects that the inhabitants of Loppersum experience due to the earthquakes?

Theoretical Framework

Negative effects of hazards

In van der Voort & Vanclay's research (2014) multiple effects due to the human-induced earthquakes in Groningen are identified. In this research, these effects are sorted into three different categories: environmental impacts, economic impacts, and mental health impacts.

The environmental impacts are the impacts on your environment. Damage to buildings is an example of this. Environmental hazards can cause damage to buildings or destroy them (Muntendam-Bos & de Waal, 2013; Postmes, et al., 2020; Sherif, 1991). People might need to take time off to solve the problems that have arisen due to the earthquakes (Stroebe, et al, 2019b; van der Voort & Vanclay, 2015). According to van der Voort & Vanclay (2015), your home is seen as a safe-haven. Damage plays a significant role in the feeling of safety, as inhabitants could feel insecure about the cracks in their house (Postmes, et al., 2017). These insecurities can lead to mental problems (Postmes, et al., 2017; van der Voort & Vanclay, 2015).

The economic impacts have to do with the financial problems that may emerge from the earthquakes. Several economic problems might arise from the earthquakes. Homeowners might endure financial insecurity as they worry that their damage will not be reimbursed or their house turns out to be a total loss (Stroebe, et al, 2019a). Hazards might lead to a reduction in house value (Stroebe, et al, 2019a). Research shows that financial insecurity could lead to mental health problems (Rajani, et al., 2016). Some of the problems that might arise are feelings of anxiety and stress (van der Voort & Vanclay, 2014).

The mental impacts are the problems with mental health that might arise due to hazards. Hazards can lead to both physical harm and mental problems (Imperiale & Vanclay, 2016). These effects can be, for example, the feeling of helplessness or irrational panic (Imperiale & Vanclay, 2016). The feelings of insecurity that arise due to the physical and economic damage can lead to health risks such as stress, insomnia, anxiety, and depression (van der Voort & Vanclay, 2014). Stroebe et al. (2022) add to this that people who have damaged houses have more problems with stress, tiredness, irritation, dizziness, and heart palpitations. According to research from Postmes, et al. (2017), people in Groningen who have had earthquake damage to their houses multiple times are two times as likely to suffer from mental issues. The main reasons for the mental and physical problems are trust issues and safety concerns (Postmes, et al., 2017). These two factors account for 11% of mental health problems and 13% of physical health problems (Postmes, et al., 2017).

There is a difference between natural hazards and human-induced hazards (Jansen & Herber, 2018; Postmes, et al., 2017; Vlek, 2018). The earthquakes in Groningen are caused by gas extraction in the region (Jansen & Herber, 2018). The earthquakes in Groningen are man-made (Vlek, 2018), in a historically aseismic region (Vlek, 2018). The earthquake activity in Groningen coincides with the amount of gas extracted (Spetzler, 2017). Stopping the gas extraction in the region will reduce the effects of the earthquakes (Vlek, 2018). Therefore, there is a choice in influencing the seismic activity in Groningen. The inhabitants of Groningen blame the government, as they are responsible for the gas extraction (Postmes, et al., 2017). Some of the inhabitants of Groningen feel that the government has abandoned them, as 72% of the inhabitants feel that the government does not take their safety concerns seriously (Postmes, et al., 2017).

81% of the population of Groningen wants the government to stop the gas extraction or lessen the amount of gas extracted from the region (Postmes, et al., 2017). Therefore, it is not strange that people who have damaged houses due to the earthquakes are less likely to trust the government than people who don't have damage to their houses (Stroebe, et al., 2022).

Place attachment

Place attachment is an adjective bond or link between people and specific places (Hernández & Hidalgo 2001; Guliani, 2003; Altman & Low, 1982). These bonds can both be negative and positive (Guliani, 2003). A place is created when people attach meanings to an undistinguished space (Tuan, 1977). Hernández & Hidalgo (2001) introduced the social and physical dimensions of place attachment.

The social dimension of place attachment is the relationship people have with the inhabitants of a certain place (Hernández & Hidalgo, 2001). The importance of social relationships for place attachment has been noted in multiple papers (Riger & Lavkaras, 1981; Low & Altman 1982; Woldoff, 2002). Low and Altman (1982) state that place attachment is not just about a physical place but also the relationships within it. These relationships can be with individuals, groups, and even cultures (Low & Altman, 1982). The social dimension, however, is not separate from the physical dimension as certain physical features, such as population density, proximity, and amenities (Fried 2000). The social dimension of place attachment is the stronger dimension compared to the physical dimension of place attachment (Hernández & Hidalgo, 2001).

The physical dimension is the relationship with the physical environment (Hernández & Hidalgo 2001). Stedman (2003) states, in light of this discussion, that we are not attached to the physical places themselves but the meaning of these places. The physical environment plays an important role in place attachment (Riger & Lavkaras, 2001; Manzo 2003). This place attachment can be towards a broad range of physical settings (Manzo 2003). It can be to build spaces, like buildings or indoor settings, as well as towards nature (Manzo, 2003).

Place attachment is not just about the characteristics of a place itself (Scannel and Gifford, 2009). The personal dimension is important in this research, as well (Scannel and Gifford, 2009). Scannel and Gifford (2009) define the personal dimension as the connections people have towards a certain place. This type of place attachment is especially strong when there are personal memories involved (Twigger-Ross & Uzzell, 1996).

The personal dimension of place attachment is present in both notions of place. The personal dimension is physical as people have important experiences in the area (Twigger-Ross & Uzzell, 1996). Manzo (2005) mentions how experiences, like critical milestones make people attached to certain places. The personal dimension is social, as well as research from Kasarda and Janowitz (1974) has shown that the length of residence is a crucial factor when talking about social relationships.

Place attachment takes place at different scalar levels (Kasarda & Janowitz 1974; Guliani, 2003; Hernández & Hidalgo, 2001). It can be towards small places, like a room, or larger places like a country or city (Guliani, 2003). For this research, the house and the village level will be used (Kasarda & Janowitz, 1974; Hernández & Hidalgo, 2001). These levels of place attachment are, compared to the neighborhood level of place attachment, less researched (Hernández & Hidalgo, 2001). Research by Hernández & Hidalgo (2001), however, shows that the house and village level have a stronger connection with the inhabitants than the neighborhood level of place attachment.

The house level entails the connection someone has towards their house (Hernandez & Hidalgo, 2001). For people, their house is a place that feels truly theirs, as they have some level of control over it (Altman & Low, 1982). One's house is seen as a safe haven (Van der Voort & Vanclay, 2014). When people are losing control over their house due to the earthquakes, together with danger coming to their safe haven, could mean that one's place attachment to their house decreases.

The village level entails the connection someone has towards their the village (Hernandez & Hidalgo, 2001). As the use of areas is strongly related to the distance from one's place of residence (Vorkin & Riese, 2001) most inhabitants use their village in their daily lives (Vorkin & Riese, 2001). Because of this use, people attach themselves to their village (Vorkin & Riese, 2001). The physical dimension is according to Hernandez & Hidalgo (2001), strong at the village level of place attachment. Therefore, the physical environment is

important. Disturbances to the physical environment, like damage to monuments (Van der Voort & Vanclay, 2015) or houses (Muntendam-Bos & de Waal, 2013) could play a role in affecting place attachment.

Community Resilience

Resilience is the ability to bounce back from a negative experience (Brown, 2014). Resilience allows systems to transform and adapt to combat disturbances (Davidson, 2010). Resilience according to Manyena (2014), is the ability to cope with or adapt to hazard stress.

Community resilience is the survival process that is put into action by communities in times of crisis (Imperiale & Vanclay, 2016), and the ability of communities to bounce back (Brown 2014) and withstand the shocks to their social infrastructure (Adger, 2000).

During a crisis, the population is engaged with the problems, as they suffer from emotional and physical effects, as mentioned before (Imperiale & Vanclay, 2016). Communities thus play an important role in the decision-making processes after a disaster. Communities react positively and effectively to disasters, despite common myths (Imperiale & Vanclay, 2016). People in communities have a voluntary and self-organizing nature (Coles & Buckle, 2003). These people have skills, resources, and organizational capacities to help people in times of crisis (Coles & Buckle, 2004). Therefore, the community is an important actor during times of crisis.

This importance of community resilience has been noticeable during several disasters; including the 2009 earthquake in the area surrounding L'Aquila (Imperiale & Vanclay, 2016), the 2014 floods in Croatia (Bakic & Ajdukovic, 2021), and hurricane Katrina in 2005 in New Orleans Louisiana (Morello-Frosch, et al., 2011).

Conceptual Model

Based on the theoretical framework, a model is constructed (see figure 2). It consists of a block about place attachment and a block about the unfavorable effects on people due to seismic activity.

In the theoretical framework, there are three impacts mentioned, the financial impact (Stroebe, et al, 2019a) the environmental impact (Postmes, et al. 2020) and the mental health impact (Postmes, et al., 2017).

The block about place attachment flows into three categories, the physical and social dimension mentioned by Hernández & Hidalgo (2001) and the personal dimension mentioned by Scannel & Gifford (2009). The personal dimension also influences the social and physical dimensions (Scannel & Gifford, 2009).

A line connects the two main blocks. This line is the influence of the effects of seismic activity on the place attachment of the inhabitants of Loppersum. This line is the main research question of this paper.

For this paper, there are two null hypotheses.

The first hypothesis of the paper is that there is no linear relationship between the effects on people due to earthquakes and the place attachment of the inhabitants towards Loppersum.

The second null hypothesis is that there is no linear relationship between the effects on people due to the earthquakes and the place attachment of the inhabitants of Loppersum towards their house.

The first null hypothesis is in line with the research conducted by Postmes (2019), but the second one is not.

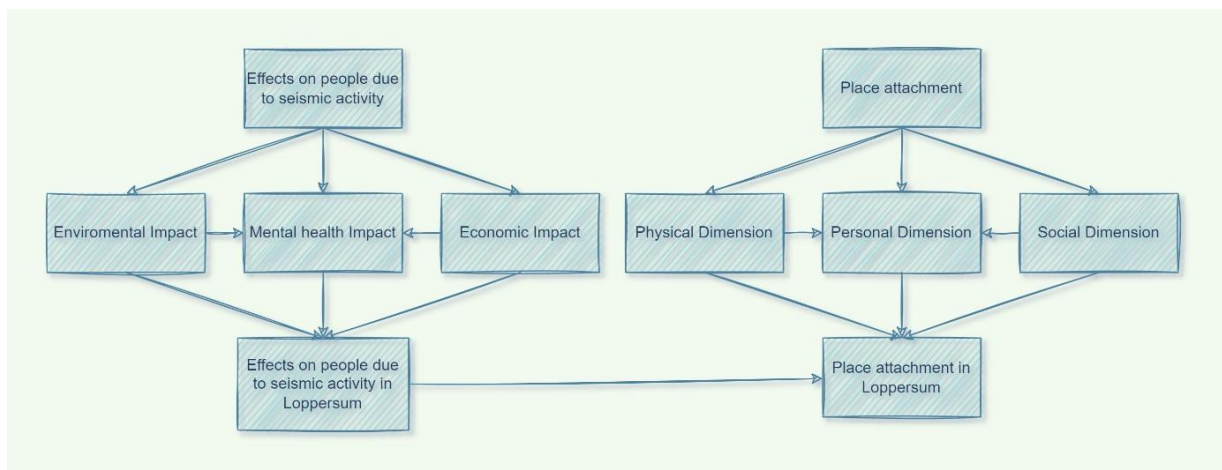


Figure 2: Conceptual Model of the effect of earthquakes on place attachment (Meijer, 2022)

Methodology

This research is done via a case study. The selected study area is the village of Loppersum, in the north of the Netherlands (see figure 3).



Figure 3: Map of the Netherlands, with Loppersum indicated on the map with a pointer (Meijer, 2022)

Loppersum is a village with 2570 inhabitants (CBS, 2021). Around 83% of the inhabitants is older than eighteen (CBS, 2021). As a result of this, the possible sample is limited to 2125 possible participants.

To answer the main research question and the last two sub-questions 2&3 a quantitative study has been used. This choice is made because a quantitative study makes it possible to reach a larger group of participants than a qualitative study. A quantitative study makes it also possible to produce objective data, resulting in numbers that can be used to perform statistical analyses. These analyses can be used to answer the research questions. These analyses show if there is a relationship between the effects of earthquakes and place attachment or not. The quantitative research will make it possible to test the hypotheses, by gathering data and analyzing it in a systematic way. The data from the quantitative research is also easier to compare to other studies that have been done before. Quantitative research helps to form objective statements about the results of your research. For the quantitative study a questionnaire has been used,

made with google forms (See Appendix A1). The participants have been asked to indicate how much they agree with each statement on a scale from one to ten. On this scale, a score of one means that they do not agree with the statement at all, and a score of ten means they completely agree with the statement. The questionnaire contains two categories of statements. These two categories are followed up by questions about the characteristics of the participant.

The first of these two categories of statements contains statements about the place attachment people feel towards Loppersum. These statements are about the house and village levels of place attachment, as well as the different components of place attachment.

The second category is about how the participants feel towards the earthquakes. These statements are about the general feeling towards the earthquakes, and the impact of the different components of the earthquakes on their lives.

The questions at the end of the questionnaire are about the characteristics of the participants. These characteristics are used to check if the sample is representative. This check is done by comparing the sample with the population of Loppersum, and helps to check for bias in the dataset.

To collect the data several sampling strategies have been used, to maximize the number of participants. The first method used was asking inhabitants of Loppersum at the local supermarket to fill in the survey (See figure 4). The shop was selected because it is in the center of Loppersum, where inhabitants get their daily groceries. Therefore the location is a suitable location for the data collection.

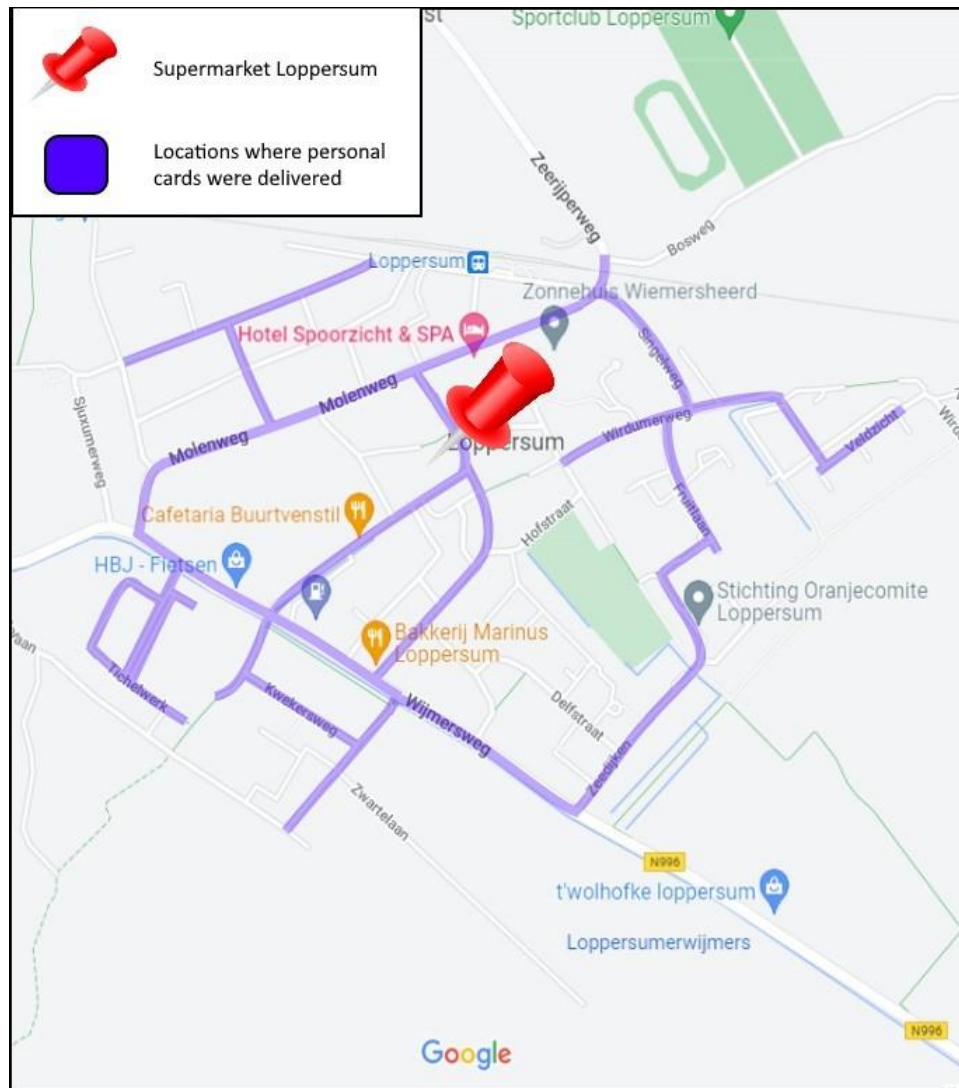


Figure 4: Map of Loppersum, with the Albert Heijn indicated with a pointer and the locations where personal cards have been delivered in blue (Meijer, 2022).

The collected data at the supermarket was not representative for the population of Loppersum, because the average age of the participants was rather high, and there were mostly female.

This is why two other sampling strategies have been used.

One of the methods is delivering personal cards with a link to my survey to homes in Loppersum (See Appendix A2). The cards have been delivered throughout the village, making sure that the sample is more diverse and representative (See figure 4).

The last strategy used is social media. Social media is used to reach younger participants as the cards brought in an older group of people as well. The survey was posted on a Facebook account. A few native inhabitants of Loppersum were asked to share the survey with other inhabitants.

The data that is used in the analysis are ratio variables. There are more than 80 cases in this study. These characteristics mean that the simple linear regression is the most suitable test for the statistical analysis.

A simple linear regression is used to answer the research questions. This test compares the variables, to see if there is a relationship, and how strong this relationship is.

The first tests are about how much each component of place attachment influences the general place attachment for the inhabitants of Loppersum. This test is done for both scalar levels of place attachment, the house and the village levels.

The second group of tests is used to check if there is a relationship between the different problems the inhabitants face due to earthquakes, as mentioned in the theoretical framework, and the general negative effects experienced due to the earthquakes.

The last group of tests compares the negative effects of earthquakes with the two scalar levels of place attachment in Loppersum.

Ethics

In this research, particular aims such as truth, knowledge, and accuracy are crucial. There will be no falsification, fabrication, or misrepresentation in this research, in line with academic ethics (Tatum & Schwartz, 2017). This is done by crediting sources when their work is used. The data that has been used is published in the appendix as well. This makes the research transparent, and thus more likely to reach the aims set for this research. To prevent bias, participants are selected from the population of Loppersum, as mentioned in the methodology.

The participants of the questionnaire are informed about the goal of the research. Participation to the research is completely voluntary, as there always is a possibility to withdraw from the research. The questionnaire has been designed to avoid personal information that could be used to trace the answers back to the participant. Only general information about the participants has been asked for. For example their age, gender and residential status.

Results

Characteristics and reflection on the sample

The dataset following from the questionnaire contains 84 cases, of which 2 are not relevant for this research. These two cases are skipped because they are younger than 18, and thus they are not allowed to participate in this research (see ethics). All the participants are currently living in Loppersum.

The sample is predominantly female, consisting of 62% of the sample. The other 38% is male (See table 1). Comparing these characteristics to the characteristics of the population of Loppersum, shows that the sample is more female than the population, as there is a gender balance in Loppersum (CBS, 2021). This means that the sample is slightly biased, as women may feel differently about a topic than males. This difference should be taken into account, when discussing the results.

Descriptive Statistics		
	N	Mean
Age (In years)	82	52,71
Gender	82	0,62
Time of residence in Loppersum (In years)	82	27,22

Table 1: Descriptive statistics

The age of the participants is concentrated around the age of 50 (See figure 5). This number is close to the mean of the sample (See table 1). The average age in Loppersum is 45 (CBS, 2021). If leave the inhabitants under 18 out of the population (17% of the population, see methodology) you get to an average age of 52 years. There is a gap between the ages of 25 and 45 in the sample. This difference should be noted when discussing the results, since different age groups look differently at the earthquake problems (). Except for this gap, the age distribution of the sample is around the same as the age distribution of the population over 18.

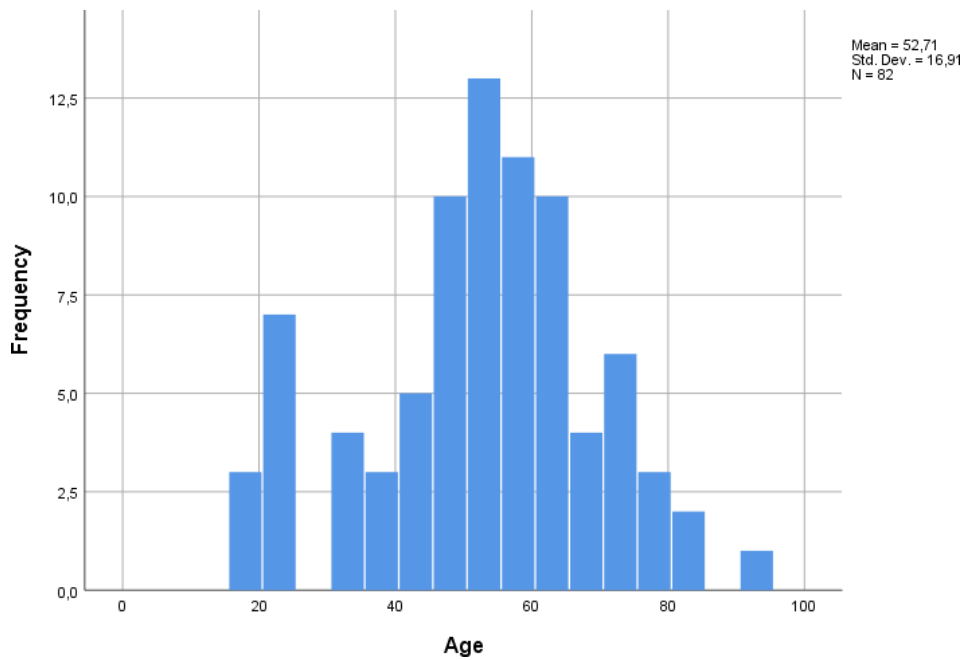


Figure 5: Histogram about the age of the participants

The histogram in figure 6 shows that the time of residence of the participants in Loppersum, is concentrated below the mean of the sample (See table 1). This should be taken into account when looking at this stat, since the time of residence for most people is less than the sample’s mean suggests.

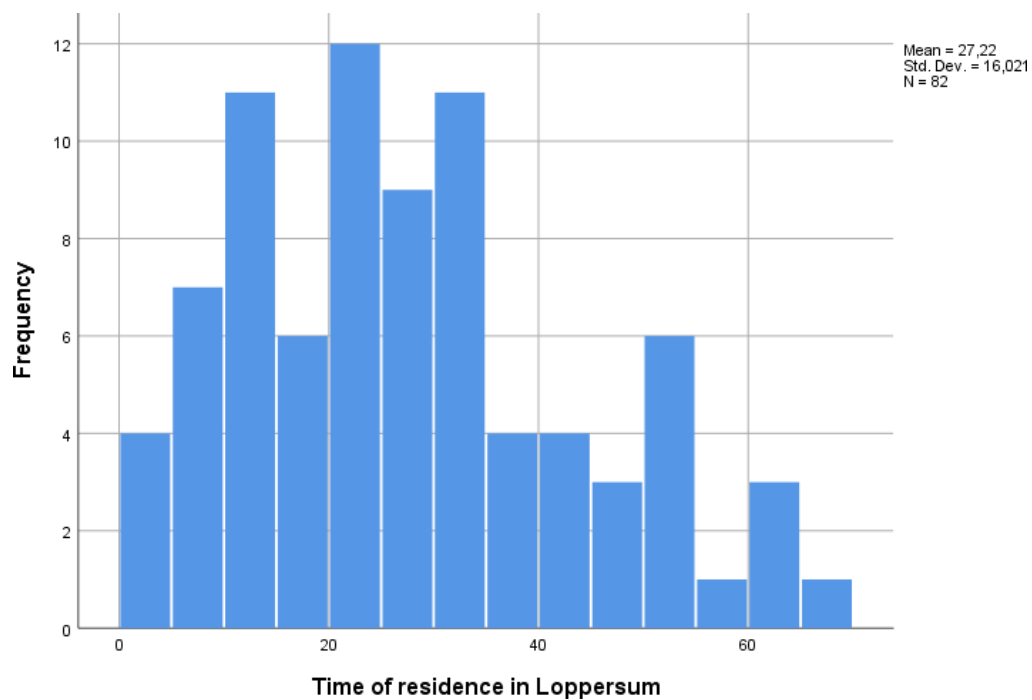


Figure 6: Histogram about the time of residence in Loppersum

The personal questions show that six people have no damage to their house, and that 18% is active in organizations involved in discussions about the negative effects of the earthquakes (See figure 7)

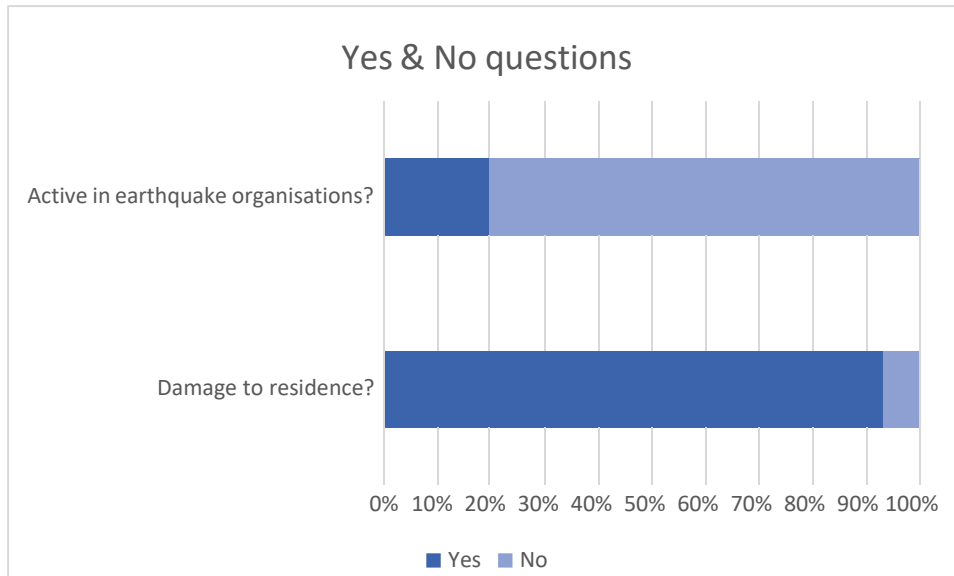


Figure 7: Yes and no questions considering the earthquakes

The sample shows that almost the entire sample is a home owner. Just 7% of the sample rents a home. This is significantly different for the population, as 69% of the inhabitants of Loppersum are home owners. 31% of the population rents a house (CBS, 2021). This means that there is a big difference between the sample and the population. This can lead to bias, since people who own their house could feel differently about the earthquakes, as it is their property that gets damaged. This difference has to be taken into account when analyzing the sample.

Results of the statements

The results from the statements are divided into two categories, place attachment and effects of earthquakes. Looking at place attachment you can see that there is a high general place attachment towards Loppersum. For the inhabitants the community dimension seems to be the most important dimension of place attachment. The place attachment to the house is stronger than the place attachment towards the village (see figure 8).

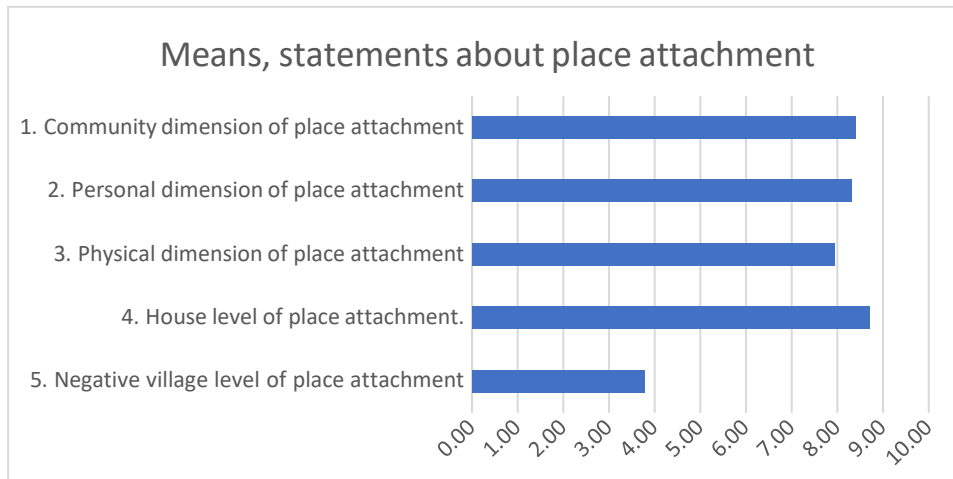


Figure 8: Means, statements about place attachment

Earthquakes play an important role in the lives of the participants. In the sample, environmental problems seem to be the biggest issues, followed by mental and economic problems. (See figure 9). The full results of the questionnaire can be found in A3.

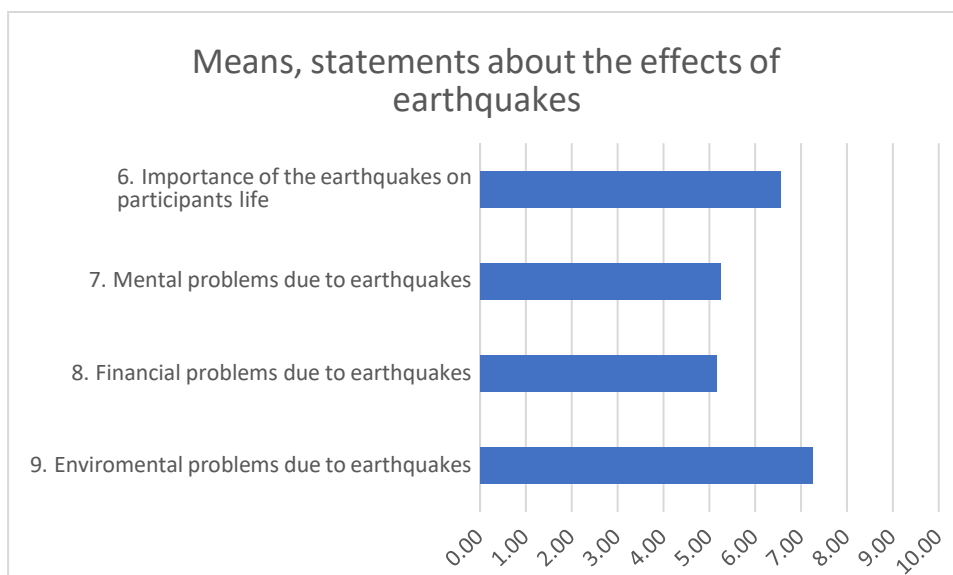


Figure 9: Means, statements about the effects of earthquakes

Statistical analysis

To find out if there is a significant relationship, the simple linear regression test is used, as mentioned in the methodology. The null hypothesis for the tests are that there is no linear relationship between the selected dependent and independent variables.

These dependent and independent variables differ per test. Therefore the dependent and independent variables will be mentioned when the specific test is discussed. The tests will be discussed in three separate chapters. The full results of these tests can be found in appendix A4.

Place attachment

In the first part of this analysis the three different dimensions of place attachment, discussed in the theoretical framework, are compared with the two scalar levels of place attachment. For the first tests, the dependent variables are the two scalar levels of place attachment, the village and the house. The independent variables are the social, physical and personal dimensions of place attachment.

The results of the first three tests can be found in table 2. These tests are about the different dimensions of place attachment compared to the general place attachment towards the village . Because the three tests are significant the null hypothesis can be rejected. This means that there is a linear relationship between each of the dimensions of place attachment and the general place attachment towards Loppersum. The tests show that the social and personal dimensions of place attachment have a moderate relationship, and the physical dimension has a weak relationship with the total place attachment towards the village of Loppersum.

Effect of different dimensions of place attachment on general place attachment towards the village					
	Sig. (1-tailed) Relationship	Pearson Correlation	R Square	Adjusted R Square	Sig. (1-tailed) (Model)
Social dimension	0,000	-0,461	21%	20%	0,000
Personal dimension	0,000	-0,493	24%	23%	0,000
Physical dimension	0,001	-0,344	12%	11%	0,002

Table 2: Effect of different dimensions of place attachment on general place attachment towards the village

The second set of tests, are about the house level of place attachment compared to the different dimensions of place attachment (See table 3). These tests are significant, so the null hypothesis can be rejected. This means that there is a linear relationship between the effects of all the different dimensions of place attachment on the general place attachment towards the house. The tests show that the house level has a weak relationship with the social and personal dimensions of place attachment. For the physical dimension of place attachment the scalar level of the house has a moderate relationship.

Effect of different dimensions of place attachment on general place attachment towards the house					
	Sig. (1-tailed) Relationship	Pearson Correlation	R Square	Adjusted R Square	Sig. (1-tailed) (Model)
Social dimension	0,003	0,303	9%	8%	0,006
Personal dimension	0,003	0,307	9%	8%	0,005
Physical dimension	0,000	0,516	27%	26%	0,000

Table 3: Effect of different dimensions of place attachment on general place attachment towards the house

Negative effects of earthquakes

The second group of tests, is to find if there is a significant relationship between the effects of the different negative aspects experienced due to earthquakes compared to the total negative effects experienced due to earthquakes (see table 4). These different negative aspects are the mental, the financial and the environmental effects. The dependent variable here is the total negative effects experienced due to earthquakes and the independent variables are the different negative aspects people experience due to earthquakes. The tests are significant, so the null hypothesis is rejected. This rejection means that there is a linear relationship between the different negative aspects people experience due to earthquakes and the total negative effects experienced due to earthquakes. The mental effects have a strong correlation, the financial effects a moderate correlation, and the environmental effects a weak correlation.

Effect of different negative aspects due to earthquakes towards total negative effects experienced due to earthquakes					
	Sig. (1-tailed) Relationship	Pearson Correlation	R Square	Adjusted R Square	Sig. (1-tailed) (Model)
Mental effects	0,000	0,720	52%	51%	0,000
Financial effects	0,000	0,485	24%	23%	0,000
Enviromental effects	0,001	0,329	11%	10%	0,003

Table 4: Effect of different negative aspects due to earthquakes towards total negative effects experienced due to earthquakes

Influence of the negative effects of earthquakes on place attachment

The last group of tests gives an answer to the main research question: “To what extent do the negative effects of seismic activity affect the feeling of place attachment of inhabitants of Loppersum?”. For these two tests the house level of place attachment and the village level of place attachment are compared with the total negative effects experienced due to earthquakes (See table 5). The two scalar levels of place attachment are the independent variables and the total negative effects experienced due to earthquakes is the dependent variable.

The first test shows that there is no significant relationship between the house level of place attachment and the total negative effects experienced due to earthquakes. This means that the null hypothesis cannot be rejected. There is therefore no linear relationship between the house level of place attachment and the total negative effects experienced due to earthquakes.

The second test does show a significant relationship. This means that the null hypothesis can be rejected for this test. This result means that there is a linear relationship between the village level of place attachment and the total negative effects experienced due to earthquakes. This relationship is weak, with an explanatory value of 13%.

Effect of negative effects experienced due to earthquakes towards the different scalar levels of place attachment					
	Sig. (1-tailed) Relationship	Pearson Correlation	R Square	Adjusted R Square	Sig. (1-tailed) (Model)
House level	0,182	-0,101	1%	0%	0,364
Village level	0,000	0,380	14%	13%	0,000

Table 5: Effect of total negative effects experienced due to earthquakes towards the different scalar levels of place attachment

Discussion

To what extent do people feel attached towards Loppersum?

The first part of the analysis answers the third research question. The third research question is: "to what extent do people feel attached towards Loppersum?"

The inhabitants of Loppersum feel that they are attached to their village. The negative place attachment for Loppersum has an average of just 3,8 out of 10 (see figure 8). Negative place attachment is the opposite of place attachment, thus the lower the score the higher the place attachment. The place attachment towards their house scores an 8,7 out of 10 (See figure 8).

For place attachment the three dimensions different play an important role (Hernández & Hidalgo 2001; Scannel & Gifford, 2009). These dimensions are the social, physical (Hernández & Hidalgo 2001) and the personal (Scannel & Gifford, 2009) dimensions.

The village level of place attachment in Loppersum

The tests show that the social and personal dimensions have the most impact on place attachment of the inhabitants of Loppersum, towards their village. The physical dimension has a weak relationship (See table 2).

The social dimension of place attachment

The strong impact of the social dimension to the village level of place attachment is in line with research of Hernández & Hidalgo (2001). This result can be explained by the time of residence. Kasarda & Janowitz (1974), note that the time of residence coincides with the amount of social relationships. This conclusion can also be drawn from the conducted survey. The survey shows that 66% of the inhabitants of Loppersum have lived for more than twenty years in the village of Loppersum (See figure 6).

The Personal dimension of place attachment

The personal dimension has the strongest influence on the place attachment of the inhabitants of Loppersum towards their village. This result can also be explained by the time of residence. Manzo (2005) states that the amount of experiences play a role in the personal dimension of place attachment. This means that the length of residences coincides with the personal place attachment. The survey shows that most inhabitants have lived in Loppersum for over twenty years (See figure 6). Therefore, the time of residence can be seen as a reason for the strength of the personal dimension of place attachment.

The physical dimension of place attachment

Hernández & Hidalgo's (2001) research states that the physical dimension is the strongest on the village level of place attachment. The results of the analysis shows that this is not the case for Loppersum (See table 2). This means that there is a difference between the results of the tests and the theoretical framework. This difference may be explained by the earthquakes taking place in Groningen. The earthquakes disturb the physical environment, by damaging houses (Postmes, et al., 2020). This may lead to a decrease in physical place attachment.

The house level of place attachment in Loppersum

The tests show that the physical dimension has a strong impact on the house level of place attachment. The personal and social dimensions have a weak relationship to the house level of place attachment (See table 3).

The social dimension of place attachment

Hernández & Hidalgo's (2001) research states that the social dimension of place attachment is the strongest dimension at the scalar level of the house. The statistical analysis shows that this is not the case for Loppersum (See table 3). This can be the case due to the different cultures between the two research areas. The research of Hernández & Hidalgo is located in the south of Spain, while Loppersum is a village in the north of the Netherlands.

The Personal dimension of place attachment

The analysis of the tests shows that the personal dimension has a weak relationship with the place attachment towards the house (See table 3). Manzo (2005) states that Milestone experiences are important for place attachment. The reason for this weak relationship can be that milestone experiences often take place, outside of one's own house.

The physical dimension of place attachment

The research of Hernández & Hidalgo's (2001) shows that the physical dimension has a lower impact on the house level of place attachment, than the social dimension. The statistical analysis shows that this is not the case for the inhabitants of Loppersum. It is not clear why this is the case.

What are the harmful effects that the inhabitants of Loppersum experience due to the earthquakes?

The second part of the analysis answers the fourth research question. The fourth research question is: "What are the harmful effects that the inhabitants of Loppersum experience due to the earthquakes?".

The impact of earthquakes on the lives on the participants was rated a 6,6 out of 10 (see figure 9). This result shows that the earthquakes have an impact on the population of Loppersum.

In the theoretical framework, three major impacts with earthquakes have been defined. These impacts are the financial impact (Postmes, et al., 2019), the environmental impact (Sherif, 1991) and the mental impact (Imperiale & Vanclay, 2016).

Financial impact

There is a financial impact according to the analysis, but this impact is not the most important one (See table 3). This may be due to the financial compensation by the NAM and government (Stroebe, et al., 2019a). The compensation does not mean that the impact is no longer relevant, but may have decreased the size of the problems. Although the financial impact can be a trigger for the mental impact (van der Voort & Vanclay, 2014).

Environmental impact

The analysis shows that there is an environmental impact, to the inhabitants of Loppersum (See table 3). It seems that people feel unsafe, due to visible damage to the structure of their house (van der Voort & Vanclay, 2014). One's house functions as a safe haven (van der Voort & Vanclay, 2014). Therefore, damage to the house has impact on how people feel about the earthquakes.

Mental impact

According to the analysis, the mental impact is the most important of the three impacts described in this chapter (See table 3). This is in line with research of Stroebe, et al. (2022), who states that the mental aspect is important. This is likely due to the fact that the financial and environmental impacts lead to mental impact (van der Voort & Vanclay, 2014). Therefore, the mental aspect has the largest impact on the general feeling towards earthquakes.

To what extent do the negative effects of seismic activity affect the feeling of place attachment of inhabitants of Loppersum?

The final part of the analysis answers the main research question. The main research question is: "To what extent do the negative effects of seismic activity affect the feeling of place attachment of the inhabitants of Loppersum?".

To answer the main research question, the two scalar levels of place attachment that are discussed in the theoretical framework are used. These scalar levels are the house and the village level (Hernández & Hidalgo 2001).

When comparing the total negative effects experienced due to earthquakes to the village level of place attachment, there is a small negative relationship of 13% (see table 5). For the scalar level of the house there is no significant relationship (See table 5).

The village level of place attachment in Loppersum

The statistical analysis states that there is no linear relationship between the house level of place attachment and the total negative effects experienced due to earthquakes. This is in line with research from Postmes, et al. (2019), who stated that there is no difference in place attachment towards the village between people with and people without earthquake damage, in Groningen. This can be the case due to community resilience. Community resilience brings people together, whether they have damage or not. This has a positive effect on the village level of place attachment.

The house level of place attachment in Loppersum

The tests show that there is a relationship between the house level of place attachment and the effects of the earthquakes in Loppersum (See table?). This is in line with research conducted by Postmes, et al. (2019), who states that there is a negative relationship between earthquakes and place attachment. This means that there is a direct relation between the effects of the earthquakes and the house level of place attachment.

Conclusion

This paper gives an answer to the research question: “To what extent do the negative effects of seismic activity affect the feeling of place attachment of the inhabitants of Loppersum?”. This question is answered, by using three sub questions. The first question is answered with the theoretical framework. The first sub question is: “What are the main effects people experience due to hazards?”. Due to hazards people experience several problems. These problems can be categorized into economic, environmental and mental problems.

The second and third sub questions are answered with a quantitative analysis. The second sub question is: “To what extent do people feel attached to Loppersum?”. It can be concluded that the inhabitants of Loppersum are attached to their village. The statistical analysis shows that for the scalar level of the village, the social and personal dimensions of place attachment are the most significant. For the house level on the other hand the physical level of place attachment is the most significant.

The third research question is: “What are the effects that the inhabitants of Loppersum experience due to the earthquakes?”. The statistical analysis shows that the mental impact is the most significant one. The mental impact is strongly related to how the population experiences the earthquakes. The economic and environmental impacts play a role as well in Loppersum, but to a lesser extent.

The main research question is: “To what extent do the negative effects of seismic activity affect the feeling of place attachment of the inhabitants of Loppersum?”. The research shows that there is no relationship between the earthquakes and the village level of place attachment. The main reason for this finding is likely community resilience, bringing people with, and without earthquake damage together.

Towards the house level, there is a significant negative impact of the earthquakes on place attachment. These findings are in line with research conducted by Postmes, et al. (2019).

More in general, we can conclude that Loppersum does not differ from the rest of Groningen. Although there are some differences, the main findings are in line with earlier research.

Reflection

Reflecting on the paper, I have experienced positive and negative aspects during the process of writing this paper.

A positive point was that the questionnaire worked out well. In previous research for different subjects the questionnaire had been unsuitable for a decent analysis. This time, however, the questionnaire was based on the literature and suitable to answer the research questions. Another positive point was that it was nice to talk with people about the earthquakes in Loppersum. This makes me feel more connected to the problems that the inhabitants of Loppersum face. A final positive point was the group that we had to do the course with. The people in the group were helpful, and gave good feedback when I asked for it.

In the process of the research I also experienced a view negative points.

One of the main issues during the data collection, was that I got ill, twice. As a result I could not get the amount of cases that I wanted, making the sample size smaller. Even though the questionnaire worked out well, there still were some issues. One of the issues was that some participants did not understand the question about the environmental impacts. The consequence of this is that some of the answers, on this question, may not be representative. The question about the village level of place attachment, should also have been phrased differently. This change should have been made because wanting to move does not mean that you are not attached to the village.

The final negative point, is that the research has certain biases. This is the case because the sample is not representative for the population of Loppersum. The sample was mostly female, and had an age gap between 25 and 40. To solve this in the future discriminative sampling could be used.

For future research, there could be a qualitative study conducted about the effects of earthquakes on place attachment of the inhabitants of Loppersum. For the research I originally intended to use interviews as well, but due to time constraints I decided to focus on my quantitative research. I did two interviews before I made this decision. The results of the interviews I did conduct, was that people have strong emotions to this topic. This was something I noticed during the surveys as well. Some people were mad, while others started to cry. This shows that a quantitative analysis alone is not enough to explain this topic. This is because a quantitative analyses just looks at factual information, but a topic like the earthquakes in Groningen is more than just that. There are so many emotions involved that quantitative research by itself is not enough to understand all elements of this topic.

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Appendix

A1 - Questionnaire

25-03-2022 14:06

Het effect van aardbevingen op plaatsgebondenheid

Het effect van aardbevingen op plaatsgebondenheid

Om af te kunnen studeren moet ik een onderzoek doen. Ik heb voor een onderwerp gekozen dat dicht bij mij ligt, namelijk de aardbevingsproblematiek. Ik kom zelf uit het dorp Bedum en wij hebben ook last van de aardbevingen.

In mijn onderzoek gaat het voornamelijk over de band met Loppersum die de inwoners hebben en wat het effect van de Groningse aardbevingen hier op is. In deze vragenlijst leg ik u een paar vragen voor die hier op in gaan. Alvast bedankt voor het invullen van mijn vragenlijst.

Plaatsgebondenheid met Loppersum

*Vereist

Ik voel me erg thuis bij de inwoners van Loppersum *

1 2 3 4 5 6 7 8 9 10

Helemaal niet mee eens Helemaal mee eens

Doordat ik al een langere tijd in Loppersum woon voel ik mij verbonden met het dorp. *

1 2 3 4 5 6 7 8 9 10

Helemaal niet mee eens Helemaal mee eens

Ik ben erg gehecht aan het dorp Loppersum zelf, zoals de natuur, infrastructuur en voorzieningen. *

1 2 3 4 5 6 7 8 9 10

Helemaal niet mee eens Helemaal niet mee eens



https://docs.google.com/forms/d/1FQtCPKXqS-Rdod-h9msPupCAZGiB_I2q9wS1iL_yAns/prefill

1/5

25-03-2022 14:06

Het effect van aardbevingen op plaatsgebondenheid

Ik ben erg gehecht aan mijn eigen huis *

1 2 3 4 5 6 7 8 9 10

Helemaal niet mee eens Helemaal mee eens

Ik heb recent nagedacht om naar een ander huis in Loppersum te verhuizen. *

1 2 3 4 5 6 7 8 9 10

Helemaal niet mee eens Helemaal mee eens

Ik heb recent nagedacht over een verhuizing naar een ander dorp dan Loppersum. *

1 2 3 4 5 6 7 8 9 10

Helemaal niet mee eens Helemaal mee eens

De rol van aardbevingen in uw leven

De Groningse aardbevingen hebben mijn leven flink veranderd *

1 2 3 4 5 6 7 8 9 10

Helemaal niet mee eens Helemaal mee eens



25-03-2022 14:06

Het effect van aardbevingen op plaatsgebondenheid

Door de (mogelijke) aardbevingen ervaar ik mentale problemen. *

1 2 3 4 5 6 7 8 9 10

Helemaal niet mee eens Helemaal mee eens

Ik heb veel last van de financiële gevolgen van aardbevingen, zoals bijvoorbeeld de daling van de waarde van mijn huis. *

1 2 3 4 5 6 7 8 9 10

Helemaal niet mee eens Helemaal mee eens

Ik heb last van de bevingsschade aan mijn huis. *

1 2 3 4 5 6 7 8 9 10

Helemaal niet mee eens Helemaal mee eens

Algemene vragen

Hoe oud bent u? (In jaren) *

Jouw antwoord

Wat is uw geslacht? *

- Man
- Vrouw
- Anders:



25-03-2022 14:06

Het effect van aardbevingen op plaatsgebondenheid

Hoe lang bent u al woonachtig in Loppersum? (In jaren) *

Jouw antwoord

Bezit of huurt u een huis? *

Ik bezit een huis

Ik huur een huis

Hebt u schade door de aardbevingen aan uw huis? *

Ja

Nee

Heeft u zelf ook actie ondernomen, met betrekking tot de aardbevingspolitiek? *

Ja

Nee

Heeft u andere op en/of aanmerkingen?

Jouw antwoord

Zou ik u eventueel mogen benaderen voor een interview? (Laat dan uw telefoon en/of uw emailadres achter)

Jouw antwoord



https://docs.google.com/forms/d/1FQtCPKXqS-Rdcd-h9msPupCAZGiB_I2q9wS1iL_yAns/prefill

4/5

A2 – Card





Hoi ik ben Xander Meijer, een 21 jarige aardrijkskunde student uit Bedum.

Om af te kunnen studeren moet ik een afsluitend onderzoek doen. Ik heb daarom voor een onderwerp gekozen dat dicht bij mij ligt, namelijk de aardbevingsproblematiek. Loppersum is hierin voornamelijk getroffen en ik hoor vaak over de problemen van mijn familie die hier woont.

In mijn onderzoek gaat het voornamelijk over de band met Loppersum die de inwoners hebben en wat het effect van de Groningse aardbevingen hier op is. Hiermee hoop ik te kunnen laten zien dat aardbevingen een veel groter effect hebben. Hiervoor heb ik een vragenlijst met verschillende vragen voor het onderzoek. Ik zou het heel fijn vinden als U de tijd zou willen nemen om het in te vullen, via het scannen van de QR code.

Hartstikke bedankt alvast!



Figure 10: Personal card that has been delivered to houses in Loppersum

A3 – Tables for the graphs

Descriptive Statistics			
	N	Yes	No
Residential status	82	93%	7%
Damage to residence?	82	93%	7%
Active in earthquake organisations?	82	18%	82%

Table 6: Yes and no questions

Descriptive Statistics				
	N	Minimum score	Maximum score	Mean
1. Community dimension of place attachment	82	1	10	8,40
2. Personal dimension of place attachment	82	2	10	8,32
3. Physical dimension of place attachment	82	2	10	7,95
4. House level of place attachment.	82	2	10	8,70
5. Village level of place attachment	82	1	10	3,77
6. Importance of the earthquakes on participants life	82	1	10	6,56
7. Mental problems due to earthquakes	82	1	10	5,24
8. Financial problems due to earthquakes	82	1	10	5,16
9. Enviromental problems due to earthquakes	82	1	10	7,26

Table 7: Main statements

A4 - Statistical tests

Linear regression between question one and five

Correlations

		5. Negative village level of place attachment	1. Community dimension of place attachment
Pearson Correlation	5. Negative village level of place attachment	1,000	-,461
	1. Community dimension of place attachment	-,461	1,000
Sig. (1-tailed)	5. Negative village level of place attachment	.	,000
	1. Community dimension of place attachment	,000	.
N	5. Negative village level of place attachment	82	82
	1. Community dimension of place attachment	82	82

Figure 11: Significance of the correlation

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,461 ^a	,212	,202	3,056

a. Predictors: (Constant), 1. Community dimension of place attachment

Figure 12: Strength of the relationship

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	12,566	1,924		6,530	,000	8,736	16,395
	1. Community dimension of place attachment	-1,047	,225	-,461	-4,644	,000	-1,496	-,598

a. Dependent Variable: 5. Negative village level of place attachment

Figure 13: Significance of the model

Linear regression between question two and five

Correlations

		5. Negative village level of place attachment	2. Personal dimension of place attachment
Pearson Correlation	5. Negative village level of place attachment	1,000	-,493
	2. Personal dimension of place attachment	-,493	1,000
Sig. (1-tailed)	5. Negative village level of place attachment	.	,000
	2. Personal dimension of place attachment	,000	.
N	5. Negative village level of place attachment	82	82
	2. Personal dimension of place attachment	82	82

Figure 5: Significance of the correlation

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,493 ^a	,243	,234	2,995

a. Predictors: (Constant), 2. Personal dimension of place attachment

Figure 6: Strength of the relationship

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	13,091	1,867		7,011	,000	9,375	16,807
	2. Personal dimension of place attachment	-1,121	,221	-,493	-5,073	,000	-1,561	-,681

a. Dependent Variable: 5. Negative village level of place attachment

Figure 7: Significance of the model

Linear regression between question three and five

Correlations

		5. Negative village level of place attachment	3. Physical dimension of place attachment
Pearson Correlation	5. Negative village level of place attachment	1,000	-,344
	3. Physical dimension of place attachment	-,344	1,000
Sig. (1-tailed)	5. Negative village level of place attachment	.	,001
	3. Physical dimension of place attachment	,001	.
N	5. Negative village level of place attachment	82	82
	3. Physical dimension of place attachment	82	82

Figure 8: Significance of the correlation

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,344 ^a	,118	,107	3,234

a. Predictors: (Constant), 3. Physical dimension of place attachment

Figure 9: Strength of the relationship

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	8,296	1,428		5,810	,000	5,455	11,138
	3. Physical dimension of place attachment	-,569	,174	-,344	-3,275	,002	-,916	-,223

a. Dependent Variable: 5. Negative village level of place attachment

Figure 10: Significance of the model

Linear regression between question one and four

Correlations

		4. House level of place attachment.	1. Community dimension of place attachment
Pearson Correlation	4. House level of place attachment.	1,000	,303
	1. Community dimension of place attachment	,303	1,000
Sig. (1-tailed)	4. House level of place attachment.	.	,003
	1. Community dimension of place attachment	,003	.
N	4. House level of place attachment.	82	82
	1. Community dimension of place attachment	82	82

Figure 11: Significance of the correlation

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,303 ^a	,092	,080	1,662

a. Predictors: (Constant), 1. Community dimension of place attachment

Figure 12: Strength of the relationship

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	5,765	1,047		5,508	,000	3,682	7,848
	1. Community dimension of place attachment	,349	,123	,303	2,843	,006	,105	,593

a. Dependent Variable: 4. House level of place attachment.

Figure 13: Significance of the model

Linear regression between question two and four

Correlations

		4. House level of place attachment.	2. Personal dimension of place attachment
Pearson Correlation	4. House level of place attachment.	1,000	,307
	2. Personal dimension of place attachment	,307	1,000
Sig. (1-tailed)	4. House level of place attachment.	.	,003
	2. Personal dimension of place attachment	,003	.
N	4. House level of place attachment.	82	82
	2. Personal dimension of place attachment	82	82

Figure 14: Significance of the correlation

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,307 ^a	,094	,083	1,660

a. Predictors: (Constant), 2. Personal dimension of place attachment

Figure 15: Strength of the relationship

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	5,756	1,035		5,563	,000	3,697	7,816
	2. Personal dimension of place attachment	,353	,122	,307	2,885	,005	,110	,597

a. Dependent Variable: 4. House level of place attachment.

Figure 16: Significance of the model

Linear regression between question three and four

Correlations

		4. House level of place attachment.	3. Physical dimension of place attachment
Pearson Correlation	4. House level of place attachment.	1,000	,516
	3. Physical dimension of place attachment	,516	1,000
Sig. (1-tailed)	4. House level of place attachment.	.	,000
	3. Physical dimension of place attachment	,000	.
N	4. House level of place attachment.	82	82
	3. Physical dimension of place attachment	82	82

Figure 17: Significance of the correlation

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,516 ^a	,267	,257	1,494

a. Predictors: (Constant), 3. Physical dimension of place attachment

Figure 18: Strength of the relationship

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	5,251	,660		7,960	,000	3,938	6,564
	3. Physical dimension of place attachment	,433	,080	,516	5,392	,000	,273	,593

a. Dependent Variable: 4. House level of place attachment.

Figure 19: Significance of the model

Linear regression between question six and seven

Correlations

		6. Importance of the earthquakes on participants life	7. Mental problems due to earthquakes
Pearson Correlation	6. Importance of the earthquakes on participants life	1,000	,720
	7. Mental problems due to earthquakes	,720	1,000
Sig. (1-tailed)	6. Importance of the earthquakes on participants life	.	,000
	7. Mental problems due to earthquakes	,000	.
N	6. Importance of the earthquakes on participants life	82	82
	7. Mental problems due to earthquakes	82	82

Figure 20: Significance of the correlation

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,720 ^a	,518	,512	1,763

a. Predictors: (Constant), 7. Mental problems due to earthquakes

Figure 21: Strength of the relationship

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	3,236	,408		7,931	,000	2,424	4,048
	7. Mental problems due to earthquakes	,634	,068	,720	9,275	,000	,498	,770

a. Dependent Variable: 6. Importance of the earthquakes on participants life

Figure 22: Significance of the model

Linear regression between question six and eight

Correlations

		6. Importance of the earthquakes on participants life	8. Financial problems due to earthquakes
Pearson Correlation	6. Importance of the earthquakes on participants life	1,000	,485
	8. Financial problems due to earthquakes	,485	1,000
Sig. (1-tailed)	6. Importance of the earthquakes on participants life	.	,000
	8. Financial problems due to earthquakes	,000	.
N	6. Importance of the earthquakes on participants life	82	82
	8. Financial problems due to earthquakes	82	82

Figure 23: Significance of the correlation

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,485 ^a	,235	,225	2,222

a. Predictors: (Constant), 8. Financial problems due to earthquakes

Figure 24: Strength of the relationship

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	4,324	,514		8,417	,000	3,301	5,346
	8. Financial problems due to earthquakes	,434	,087	,485	4,957	,000	,260	,608

a. Dependent Variable: 6. Importance of the earthquakes on participants life

Figure 25: Significance of the model

Linear regression between question six and nine

Correlations

		6. Importance of the earthquakes on participants life	9. Enviromental problems due to earthquakes
Pearson Correlation	6. Importance of the earthquakes on participants life	1,000	,329
	9. Enviromental problems due to earthquakes	,329	1,000
Sig. (1-tailed)	6. Importance of the earthquakes on participants life	.	,001
	9. Enviromental problems due to earthquakes	,001	.
N	6. Importance of the earthquakes on participants life	82	82
	9. Enviromental problems due to earthquakes	82	82

Figure 26: Significance of the correlation

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,329 ^a	,108	,097	2,399

a. Predictors: (Constant), 9. Enviromental problems due to earthquakes

Figure 27: Strength of the relationship

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	4,475	,720		6,214	,000	3,042	5,908
	9. Enviromental problems due to earthquakes	,287	,092	,329	3,115	,003	,104	,471

a. Dependent Variable: 6. Importance of the earthquakes on participants life

Figure 28: Significance of the model

Linear regression between question four and six

Correlations

		4. House level of place attachment.	6. Importance of the earthquakes on participants life
Pearson Correlation	4. House level of place attachment.	1,000	-,101
	6. Importance of the earthquakes on participants life	-,101	1,000
Sig. (1-tailed)	4. House level of place attachment.	.	,182
	6. Importance of the earthquakes on participants life	,182	.
N	4. House level of place attachment.	82	82
	6. Importance of the earthquakes on participants life	82	82

Figure 29: Significance of the correlation

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,101 ^a	,010	-,002	1,735

a. Predictors: (Constant), 6. Importance of the earthquakes on participants life

Figure 30: Strength of the relationship

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	9,152	,536		17,060	,000	8,085	10,220
	6. Importance of the earthquakes on participants life	-,070	,076	-,101	-,913	,364	-,222	,082

a. Dependent Variable: 4. House level of place attachment.

Figure 31: Significance of the model

Linear regression between question six and seven

Correlations

		5. Negative village level of place attachment	6. Importance of the earthquakes on participants life
Pearson Correlation	5. Negative village level of place attachment	1,000	,380
	6. Importance of the earthquakes on participants life	,380	1,000
Sig. (1-tailed)	5. Negative village level of place attachment	.	,000
	6. Importance of the earthquakes on participants life	,000	.
N	5. Negative village level of place attachment	82	82
	6. Importance of the earthquakes on participants life	82	82

Figure 32: Significance of the correlation

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,380 ^a	,144	,133	3,186

a. Predictors: (Constant), 6. Importance of the earthquakes on participants life

Figure 33: Strength of the relationship

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	,392	,985		,398	,692	-1,568	2,352
	6. Importance of the earthquakes on participants life	,515	,140	,380	3,670	,000	,236	,794

a. Dependent Variable: 5. Negative village level of place attachment

Figure 34: Significance of the model