

**What Are the Feelings Prompted by Manifestations of Climate Change Among the Young
Generations? A Survey Among University Students in Fryslân**

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Abstract

Climate change is not just an environmental problem, but the acute and chronic environmental changes also prompt emotions and psychological problems in people. This research aims to assess the type and intensity of feelings that different manifestations of climate change elicit in young people living in Fryslân. A literature review has been conducted to define different manifestations of climate change and a range of emotions induced by those. The questionnaire was disseminated to various universities in Fryslân, and the results were analyzed by descriptive analysis. By including two pictures for each manifestation, the researcher tried to estimate how much each feeling can be attributed to the picture itself and how much to the underlying climate change manifestations. The results suggest that young people have not only pessimistic views on climate change but also experience high levels of climate anxiety. While no major differences in the feelings prompted by the different manifestations had been found within age and gender groups, and people that indicated whether they are involved in farming activities or not, it was observed that sadness was the feeling most often prompted in all participants. Farmers' vulnerability potentially led to the observation of anger only shown in their group, and their agricultural need for water might indicate why precipitation elicited happiness in them. Therefore, this research contributes to knowledge on emotional responses to climate change by being the first of its kind to look at young people living in Fryslân and investigate their feelings evoked by climate change manifestations.

Keywords: climate change, eco-anxiety, emotions, mental health, psychological impact, youth, Friesland

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Introduction

Caused by climate change, we are and will continue to experience an increased frequency and severity of extreme weather events as well as long-lasting changes in climate. Events such as droughts and floods will have detrimental effects on food security, water availability, agricultural productivity, and natural ecosystems (Sanson et al., 2019). These environmental worries are expected to take numerous different forms that will greatly differ across individuals, nations, and cultures (Verplanken et al., 2020). Concerns about climate change are not just an environmental problem, but the acute and chronic environmental changes also prompt emotions and psychological problems in humans (Hickman et al., 2021; Verplanken et al., 2020). The distress caused by climate change can be seen in countries directly affected by physical impacts of climate change, as well as in countries where direct impacts are not evident or less severe (Hickman et al., 2021). On an individual level, if climate change affects a person directly, for instance, people that are involved in farming activities, this may evoke different sentiments of feelings than if a person is simply just passionate about climate change without being directly affected by it (Berry et al., 2011; Clayton, 2020; Haden et al., 2012). The threat and loss involved with the changing climate can potentially generate emotional anguish, namely, anxiety, frustration, and grief, which can be captured by terms such as eco-anxiety or solastalgia. However, individuals can also experience positive emotions leading to the promotion of productive engagement with climate change (Stanley et al., 2021; Verplanken et al., 2020). Generally, children tend to have more pessimistic views concerning the future of climate events manifesting in intense forms of climate and eco-anxiety (Hickman et al., 2021); however, this might be culturally and geographically driven.

Fryslân is a province located on the northern coast of the Netherlands (van der Vaart, 2005). Altogether, Fryslân has 18 municipalities with a total population of 651.435, of which approximately 70.822 are between the ages of 17-25. Furthermore, data from 2019 has shown that within the province of Fryslân, 4.254 people are registered as farmers (*Friesland Databank*, n.d.). In 2017, around 77% of the provincial land area was used for agriculture. This share of 77% is well above the national average of 66%, which, as indicated by Plantinga et al. (2018), can be attributed to the rich agricultural traditions that the province has. As a result, the agricultural food sector provides work to almost 30.000 people in Fryslân (Plantinga & Molema, 2019). This high share of agricultural involvement in the province is expected to be evidentially presented in this study, thus, potentially evoking different sentiments of feelings in participants that are involved with farming activities compared to those who are not, as suggested by literature (Berry et al., 2011; Clayton, 2020; Haden et al., 2012).

The literature review has shown that only limited research has investigated the mental impacts of climate change on young people, as most of the existing literature focuses on the older generation. Furthermore, to this date, no research examined the psychological impacts of climate change on the younger population living in Fryslân. Consequently, this research aims to assess the type and intensity of feelings that different manifestations of climate change elicit in young people in Fryslân, answering the research question:

“Which emotions do different manifestations of climate change elicit in young people living in Fryslân, and with what relative intensity do these occur?”

In order to assess the aim of the research, an extensive literature review identified a definite number of manifestations that result from climate change and defined possible emotions

these manifestations can elicit in a person. Additionally, to support the rationale for the importance of this work, the literature research will shed light on the work that has already been produced about the psychological impacts of climate change on the emotions of young people. Then, an explanation of the methodological approach of this paper will be provided, which will cover the research design, as well as the data collection and analysis. Furthermore, the results from the survey will be presented, and the most significant results will further be interpreted in the discussion section, where the findings will also be placed into context. Finally, the paper will note the encountered limitations, provide recommendations for future research, and conclude the research.

Literature Review

Climate change is happening faster than most scientists predicted (Sanson et al., 2019). With rising temperatures all around the globe, especially the oceans are impacted, leading to melting glaciers and rising sea levels due to warming oceans (Zurbenko & Potrzeba-Macrina, 2021). By combining satellite observations and numerical models from 1994 to 2017, Slater et al. (2021) showed estimates of around 28 trillion tons of global ice loss. An extreme example that illustrates this ice loss is Venezuela, which in 2019 became the first country in the world that has already lost all of its glaciers due to climate change and global warming (Yarzabal et al., 2021). Furthermore, increasing atmospheric carbon dioxide levels directly affect the carbonate chemistry within oceans, leading to ocean acidification (Fahey et al., 2017). According to Fahey et al. (2017), “ocean waters have become 30% more acidic over the last 150 years [...]”, this includes both the open ocean acidification as well as coastal acidification. Not only the oceans are impacted by climate change, but as a visible consequence of the warming world, extreme

weather events such as droughts, floods, wildfires, extreme precipitation, frosts, and extreme storms are becoming more intense and frequent (Center for Climate and Energy Solutions, 2022).

Emotions Induced by Climate Change Manifestations

According to Brosch (2021), emotions are “adaptive reactions that are elicited when an event or an object is appraised as relevant to one’s concerns, resulting in changes in motivational action tendencies, physiological reactions, expressions, and subjective feelings”. In this context, emotions are influenced by the different manifestations of climate change and are affected by many contextual factors (Pihkala, 2022).

Sadness is one of the most researched climate-related emotions. This emotion often reflects the grief commonly experienced as a response to climate change-related losses and oftentimes occurs in complicated forms. Many scholars refer to those emotions as ‘climate grief’ or ‘climate sadness’ (Cunsolo & Ellis, 2018; Pihkala, 2020). Furthermore, fear and anxiety are emotions that are related to risk and threat perceptions, which are expressed and felt at different intensities. Both emotions are triggered by a threat to one’s sense of safety, linking to insecurities that arise from the threats climate change poses (Pihkala, 2022). How individuals put their fear into action is dependent on whom they blame for the circumstances that make them feel as if they are not capable of dealing with danger. When they attribute the blame to themselves, they are more likely to withdraw, while holding others accountable will lead to hostility (Barbalet, 1998). Applying this to the concept of climate change means that fear of climate change and one’s self incapacity to prevent or change it may lead to withdrawal, while accounting the responsibility of it to someone else may elicit anger in an individual and therefore lead to mobilization (Kleres & Wettergren, 2017). Climate anxiety, in contrast, is more commonly

experienced by people who care about environmental issues or those directly affected by its consequences. While some argue that climate anxiety may induce motivation in people to engage and become active about climate change, others propose that climate anxiety could actually lead to paralysis that hinders people from becoming proactive (Clayton, 2020). Another emotion elicited by climate change is anger. Anger is not only experienced by just causes but is also fueled by misconceptions about injustices, such as inaction toward climate change (Pihkala, 2022). According to Stanley et al. (2021), experiencing anger about climate change may lead to more pro-environmental behavior as well as mobilization and engagement with activism.

Nevertheless, the threat of climate change can also generate ‘good feelings’. Those good feelings can be motivated by pro-environmental behavior, social engagement, or the (perceived) removal of environmental threats and lead to a sense of empowerment or positive emotions (Doherty & Clayton, 2011; Pihkala, 2022).

Not only can climate change affect a person's feelings and emotions, but weather conditions are also proven to affect both feelings and emotions and prosocial behavior. For instance, in their study Connolly (2012) suggested that more precipitation was associated with less sadness, stress, and tiredness. In turn, scholars have found evidence that droughts lead to decreased life satisfaction and reduced happiness. This can especially be observed in people living in rural areas (Carroll et al., 2007; Keshavarz & Karami, 2012).

The Impact of Climate Change on Mental Health

As already mentioned above, climate change is not only causing environmental changes but also affecting the well-being of humans. A fact sheet by the WHO (2021) has shown that the number of deaths due to climate change-induced impacts is expected to increase by 250.000 per

year between 2030 and 2050. Highly important but mostly neglected in this context are mental illnesses. This was illustrated by the Lancet report of 2017, as well as earlier reports (Murray et al., 2012; Patel et al., 2016). With 7.8 %, mental illnesses contribute to a high share of the global burden of diseases, which highlights how concerning this neglect is (Murray et al., 2012). In their research, Hayes et al. (2018) differentiated two ways climate change consequences manifest in mental health. Firstly, direct consequences, which include trauma that is related to extreme weather events such as wildfires, floods, or extreme heat waves/droughts. For instance, the occurrence of depression, psychological distress, as well as PTSD has been mapped by Bryant et al. (2014) as the psychological outcomes of communities most at risk after the Black Saturday bushfires in Australia.

Furthermore, events of high humidity and extreme heat have been linked to increased hospitalizations for mood and mental disorders such as mania or schizophrenia (Hayes et al., 2012). Secondly, climate change also has indirect consequences on a person's mental health, which arise through economic, environmental, or social disruptions, including food and water insecurity that leads to famine, migration, or displacement. The climate manifestation that has been documented the most relating to this is droughts. The impacts are linked to forced displacement or migration, both having a detrimental influence on stress, anxiety, PTSD, or trauma (Hayes et al., 2018).

Nevertheless, some people find it difficult to recognize if and how the climate changes because it often appears abstract or distant to them; this is especially the case because climate change is often confused with weather or seasonal changes. Anthony Giddens (2009) refers to this as the Giddens Paradox stating that "since the dangers posed by global warming aren't tangible, immediate or visible in the course of day-to-day life, many will sit on their hands and

do nothing of a concrete nature about them. Yet waiting until such dangers become visible and acute—in the shape of catastrophes that are irrefutably the result of climate change— before being stirred to serious action will be too late” (p. 2). Many countries are not yet or less severely impacted by climate change at this point in time, making it seem as if climate change is a future problem, but it is also a problem of the past and the present that requires immediate action (Giddens, 2009). It is important to note that how society is addressing or not addressing the problem of climate change shapes partly the response of some people to climate change, whether it is anxiety or no response at all. Therefore, interventions to preserve mental health are unlikely to be effective without social or global attention to the problem (Clayton, 2020). Keeping this in mind, it becomes even more evident how important it is to tackle and acknowledge the current consequences of climate change on mental health.

The Impact on Young People

A group that is particularly vulnerable to climate change is young people; nevertheless, they have received a lesser focus on research than adults did (Burke et al., 2018). According to the WHO, young people under the age of five account for more than 88% of the existing burden of disease caused by climate change (Sheffield & Landrigan, 2011). Even less documented for young people are those impacts of climate change that also lead to mental health and psychological consequences (Burke et al., 2018). What makes them particularly vulnerable to climate change is that they exhibit stronger responses to extreme weather events. These responses can include Posttraumatic Syndrome Disorder (PTSD), sleep disorders, or depression. This is because they heavily rely on adult family members and a working social support network, which may be interrupted by an extreme weather event (Clayton, 2020; Sanson et al., 2019). For instance, in their research, Gibbons (2014) illustrated that following the floods in Pakistan in

2010, 73% of 10 to 19-year-olds showed signs of PTSD, with displaced girls being the most severely impacted. The risk of long-term and irreversible impacts of early trauma events is of special concern, as these might damage a young person's capacity to regulate their emotions, which in turn can lead to behavioral or learning difficulties. Moreover, experiencing stress early on in life might also increase the likelihood of having mental health issues later in life (Burke et al., 2018).

Interviews that were conducted with young people from different countries between 2016 and 2021 revealed high levels of climate and environmental anxiety (Hickman et al., 2021). When reporting the degree of climate anxiety that impacts the ability to function, younger people (18-35) reported significantly higher scores than older people. Moreover, younger people, especially women, are overall more stressed about climate change than people over the age of 35 (Coffey et al., 2021). According to qualitative studies that have been carried out since 2010, children have pessimistic views on the future of the climate. These pessimistic views are fueled by the inaction of adults towards climate change, which leads to an additional layer of psychological stress triggered by the feelings of abandonment, betrayal, and confusion many young people are experiencing (Hickman et al., 2021). Here, active engagement, such as youth activism, has been named as something that helps young people turn their pessimistic views into optimism and determination while simultaneously managing their anxiety about the future and the climate crisis (Sanson et al., 2019). For instance, in March 2019, approximately 16 million young people protested the urgency of addressing climate change across 125 countries (Wu et al., 2020). Nevertheless, only limited research has further investigated the mental impacts of climate change on young people.

Methodology

Research Design

This research aimed to assess the type and intensity of feelings that different manifestations of climate change elicit in young people in Fryslân. In order to do so, first, a literature review has been conducted that defines eight different manifestations of climate change and a range of emotions induced by those. After that, 16 pictures were collected depicting different consequences of climate change, and a questionnaire was designed for the research. The questionnaire included two pictures per eight climate change manifestations. Participants were asked to associate one or more emotions to each picture and a relative intensity with which the picture elicits the emotion. These emotions included happiness, sadness, anger, boredom, fear, anxiety, and nerdiness as a distractor. The questionnaire was disseminated to various universities in Fryslân to collect the data, and after the completion of the collection, the results were analyzed.

Data Collection

Literature Review

First, secondary data was collected using a literature review to deepen the understanding of the knowledge that has already been produced around the psychological impacts of climate change on the emotions of young people. This acted as a theoretical framework that defined a definite number of manifestations that result from climate change, namely melting glaciers and rising sea levels, warming oceans and acidification, as well as extreme weather that include droughts, floods, wildfires, extreme precipitation, frosts, and lastly, extreme storms. While at the same time, defining possible emotions these manifestations can elicit in a person, namely happiness, sadness, anger, boredom, fear, anxiety, and a distractor. For this, scientific articles and

books were broadly searched and identified on Google Scholar and SmartCat, using the keywords “climate change”, “eco-anxiety”, “mental health”, “psychological impact”, “youth”, “consequences”, and “emotions”. The recent systematic review of current literature and knowledge gaps on eco-anxiety by Coffey et al. (2021) acted as a substantial source to understand the operationalization of eco-anxiety in the existing literature.

Materials

For this research, a questionnaire has been designed. The questionnaire showed two pictures per eight climate change manifestations, which had been collected on the web pages ‘Freerange stock’, ‘Unsplash’, and ‘Pexels’. All pictures are legally sourced stock images that are free of use for commercial purposes. In the questionnaire, participants were asked to associate one or more emotions to each picture and indicate the relative intensity with which the picture elicited the emotion. Additionally to the seven emotions that were given on the questionnaire, participants had the option to add one or two different emotions to the list.

Furthermore, participants were asked to indicate their socio-demographic backgrounds by answering questions about their country of birth, the university they attend, age, if at least one parent was born in another country, gender, ethnicity, if they were born in a small village, a town, or a city, and lastly, if their direct family is engaged in farming activities.

Procedures

The selection process of participants followed voluntary response sampling. Questionnaires were sent out to universities located in the Dutch province of Fryslân. There, the questionnaires were distributed to students by the staff by sharing a link as well as a QR code that led to the online questionnaire. Therefore, the target group consisted of students currently

attending university in the region of Fryslân. They can be just living in the Netherlands and Fryslân as part of their study or be born there. Furthermore, the questionnaires were distributed on Instagram, Twitter, WhatsApp, and LinkedIn social media channels.

Ethical Considerations

Before the data collection, this research was approved by the Ethical committee of Campus Fryslân. In order to participate in the research, participants had to give their informed consent before filling in the questionnaire. With this, participants were informed about the aim of the research, any specific risks in participating, as well as the institutional approval. In order to guarantee privacy, data was gathered anonymously, and confidentiality was secured by removing potentially identifying information in all data reports. Additionally, participants were informed that they were free to opt-in or withdraw from the study at any point in time, and it was stressed that if questions arose, the researcher could be contacted for answers.

Furthermore, physical, social, psychological, and all other types of harm were kept to an absolute minimum. However, to counteract the distress caused by asking about feelings evoked by climate change, participants were provided with a list of accessible services they could approach in case they experienced any uneasiness.

Data Analysis

Before performing the analysis, the gathered data was prepared by checking for missing data and normal distribution. The data on socio-demographics were summarized to get an overview of the participant's background. For this, the researcher made a table (**Table 1**) that displayed country of birth (the Netherlands, Germany, other), university (Campus Fryslân, NHL Stenden, Van Hall Larenstein, other), age (17-19, 20-22, 23-25), gender (female, male, or

non-binary/third gender), if both of the parents were born in the Netherlands (yes or no), geographical birthplace (small village, town, or city), and farming activity (yes or no). Then the data were analyzed, for which a descriptive analysis of the results was conducted. First, the average feeling (mode) and its intensity were identified for each manifestation and summarized in a table (**Table 2**). This table also included the number of valid observations for the variable, namely N. After that, the correlation coefficient between two pictures that depict the same manifestation of climate change was measured to see the ability of two pictures to represent the same climate change manifestation.

Furthermore, the researcher tried to account for differences between age and gender groups, as well as farming activities. For this, the dataset was organized into different ages, gender, and farming groups. These included participants of the ages 17-19, 20-22, 23-25; female, male, or non-binary/third gender identifying participants; and participants that either indicated yes or no to the question about their farming involvement. Thereafter, the researcher distinguished between the intensity of the feelings and only used the data of the intensities ‘strongly’ and ‘very strongly’. The frequency of which the data occurred for both ‘strongly’ and ‘very strongly’ in the data set was counted for each climate manifestation and summed up. As there were two pictures of each climate manifestation, the sum of the data was averaged. Lastly, three different box plots were created to visualize the differences in elicited feelings among gender, age, and farming groups for each climate change manifestation (**Figures 1, 2, and 3**).

Results

Socio-Demographics

Approximately 580 students were invited to participate in this research, to which 123 responded. Of the 123 participants that started the survey, 62 did not finish, and five failed to meet the requirement of being under the age of 25. Hence, 56 participants were included in the analysis. Including the five responses that failed to meet the requirements, the response rate of this study was approximately 11%.

Most participants (48.2% and 31.1%) were born in the Netherlands and Germany, with the majority of them (78.6%) attending University Campus Fryslân. Furthermore, most of the participants (58.9%) were between the ages of 20 and 22 years old, and 76.8% were female. Of the 56 participants, 55.4% indicated that at least one of their parents was not born in the Netherlands, and 67.9% selected that none of their direct family members is involved in farming activities. Lastly, with 46.4%, the majority of participants were born in cities (**Table 1**).

Table 1

Sociodemographic Characteristics of Participants

	n	%
Country of Birth		
The Netherlands	27	48.2
Germany	18	32.1
Other	8	14.3
University		
Campus Fryslân	44	78.6
NHL Stenden	5	8.9
Van Hall Larenstein	6	10.7
Other	1	1.8
Age		
17-19	10	17.9
20-22	33	58.9
23-25	11	19.6
Other	2	3.6
Gender		
Female	43	76.8
Male	11	19.6
Non-Binary/Third-Gender	2	3.6
Both Parents Born in the Netherlands		
Yes	25	44.6
No	31	55.4
Geographic Birthplace		
Small Village	16	28.6
Town	14	25

City	26	46.4
Farming Activity		
Yes	18	32.1
No	38	67.9

Note. $N = 56$

Descriptive Analysis

As seen in **Table 2**, the feelings (modes) most frequently selected by participants were sadness, anxiety, happiness, and fear. The same feelings were elicited in participants when observing both pictures of the climate change manifestations of floods, frosts, melting glaciers, storms, and warming oceans. However, the two pictures depicting wildfires prompted different average feelings: sadness and anxiety. The second picture of the climate manifestation of droughts elicited two average feelings, happiness and sadness, and the first picture portraying precipitation prompted both anxiety and happiness. The average intensities of all feelings varied from ‘very mildly’ to ‘very strongly’. Moreover, for the climate change manifestations of frosts, melting glaciers, storms, and warming oceans, the results of the data analysis of both pictures showed that the intensity of the feelings was the same.

By measuring the correlation coefficient between the same sentiment across two pictures that depicted the same manifestations, it was found that all pictures have a positive correlation coefficient. However, the degree of correlation was different in each climate manifestation. As Taylor (1990) described in their paper, correlation coefficients lower than 0.35 are considered low or weak correlations, correlation coefficients of 0.36 to 0.67 represent modest to moderate

correlations, and 0.68 to 1 indicate a strong or high correlation. According to this, the two pictures that depicted droughts had low correlations, precipitation a modest correlation, and floods, melting glaciers, storms, warming oceans, as well as frost a strong correlation (**Table 2**).

Table 2

The Average Feelings, their Intensity, and the Correlation Coefficient

	n	Feelings (Mode)	Average Intensity of the Feelings	Correlation Coefficient
Droughts 1	55	Sadness	Strongly & Very Strongly	0,35
Droughts 2	51	Happiness & Sadness	Very Mildly & Strongly	
Floods 1	55	Sadness	Strongly	0,70
Floods 2	55	Sadness	Very Strongly	
Frost 1	53	Happiness	Neutral	1
Frost 2	53	Happiness	Neutral	
Melting Glaciers 1	56	Sadness	Strongly	0,99
Melting Glaciers 2	54	Sadness	Strongly	
Precipitation 1	55	Anxiety & Happiness	Strongly, Neutral	0,56
Precipitation 2	53	Happiness	Neutral	
Storms 1	55	Fear	Strongly	0,79
Storms 2	55	Fear	Strongly	
Warming Oceans 1	56	Sadness	Strongly	0,77
Warming Oceans 2	53	Sadness	Strongly	
Wildfire 1	56	Sadness	Very Strongly	
Wildfire 2	56	Anxiety	Strongly	

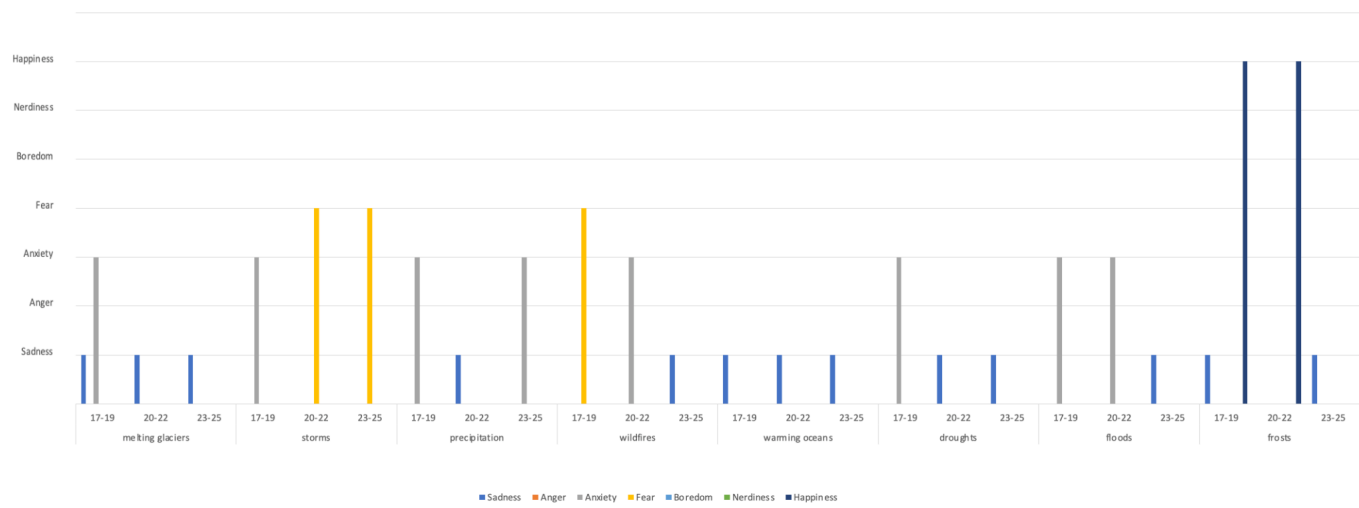
Note. N = 56

Differences Between Subgroups

The next step of the descriptive analysis was to look for differences that the manifestations elicited between age, gender, and farmer groups. From the analysis of the three different age groups (17-19, 20-22, 23-25), it can be observed that there were no major differences. As seen in **Figure 1**, the feelings elicited within the three age groups were sadness, anxiety, fear, and happiness. Additionally, sadness was the feeling that could be seen the most in **Figure 1**. At least two of the three age groups showed the same feelings for most climate change manifestations. Only the climate change manifestations of warming oceans and melting glaciers elicited the same feeling in all three age groups - sadness. The age group, 17-19, displayed two feelings about the manifestations of the melting glaciers and frosts' climate change. These were sadness and anxiety for melting glaciers and happiness and sadness for frost (**Figure 1**).

Figure 1

Differences Among Different Age Groups

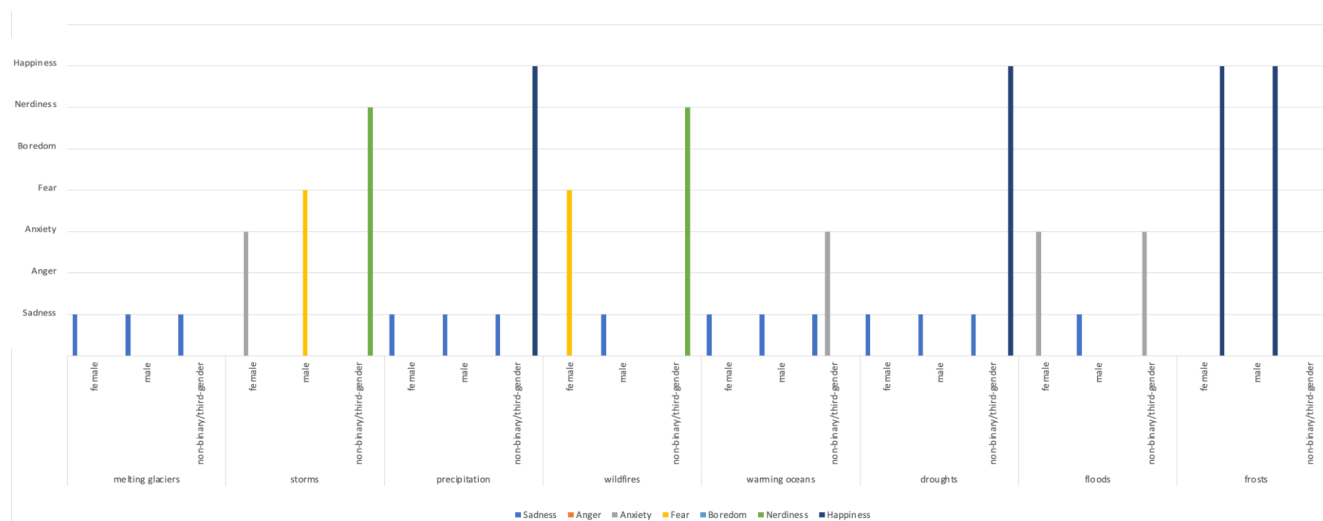


Note. N = 56 (n = 10 for 17-19-year-olds, n = 33 for 20-22-year-olds, n = 11 for 23-25-year-old)

When looking at the differences that the manifestations elicited between gender groups (female, male, and non-binary/third-gender), it can be observed that the feelings that were prompted within the groups were sadness, anxiety, fear, happiness, and the control variable nerdiness (**Figure 2**). Sadness was the most prominent feeling that the participants chose. In the climate change manifestations of precipitation, warming oceans, and droughts, the non-binary/third-gender group displayed two feelings for each manifestation. Those were sadness and happiness for precipitation, sadness and anxiety for warming oceans, and lastly, sadness and happiness for droughts. The manifestation of frosts elicited happiness in all three gender groups. In contrast, melting glaciers, precipitation, and droughts all prompted sadness for female, male, and non-binary/third-gender identifying participants. Generally, it can be observed that there were no major differences in the emotions elicited by the climate change manifestations between the gender groups (**Figure 2**).

Figure 2

Differences Among Gender Groups

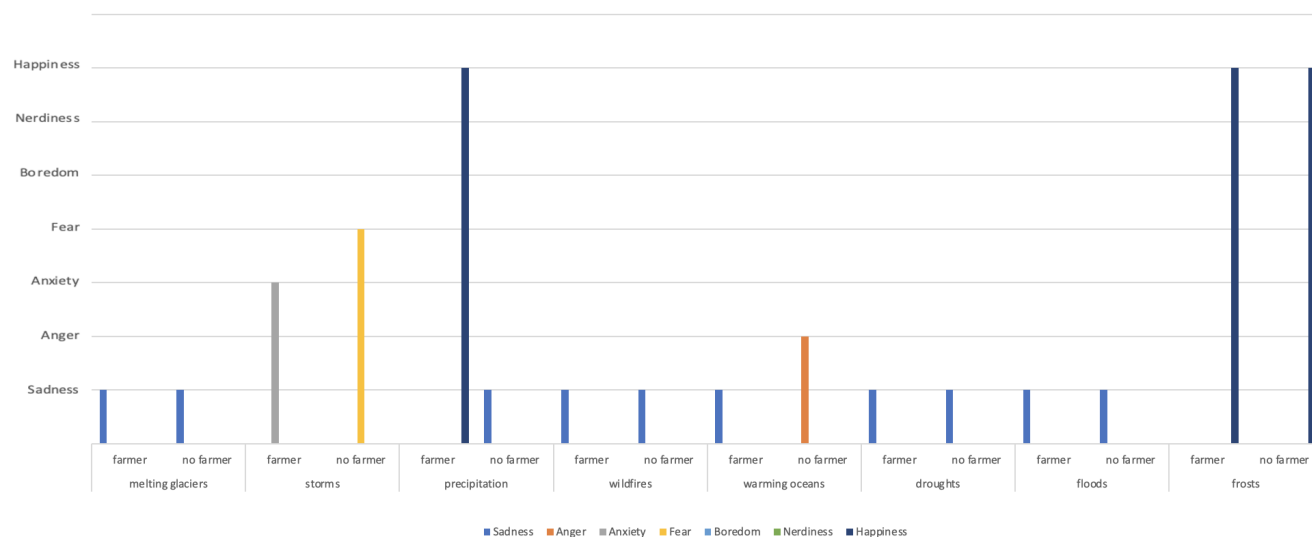


Note. $N = 56$ ($n = 43$ for female, $n = 11$ for male, $n = 2$ for non-binary/third gender)

From the analysis of the farming groups (farming involvement and no farming involvement), it can be observed that the feelings elicited by the different pictures of the climate change manifestations within the group were sadness, anxiety, fear, happiness, and anger. As seen in **Figure 3**, sadness was the feeling most often prompted in participants of both groups. Melting glaciers, wildfires, droughts, and floods all elicited the feeling of sadness in participants. Furthermore, when looking at the results of **Figures 1, 2, and 3**, it can be observed that the feeling of anger was only prompted in this group, but no other. As displayed in **Figures 2 and 3**, the manifestation of frosts elicited happiness in both farmer groups.

Figure 3

Differences Among Farming Involvement



Note. N = 56 (n = 18 for farming involvement, n = 38 for no farming involvement)

Discussion

In order to explore which feelings are evoked by which climate manifestations, while accounting for the differences between different genders, ages, and farming backgrounds, the

researcher tried to answer the following research question: “*Which emotions do different manifestations of climate change elicit in young people living in Fryslân and with what relative intensity do these occur?*”. Therefore, this research contributes to knowledge on emotional responses to climate change by being the first of its kind to look at young people living in Fryslân and investigate their feelings evoked by climate change manifestations, exploring differences across gender, age, and family involved in farming. By including two pictures for each manifestation, the researcher tried to estimate how much each feeling can be attributed to the picture itself and how much to the underlying climate change manifestations.

As the literature suggests, using pictures to communicate the different climate change manifestations to participants is very valuable, as affective information depicted through pictures rather than written words elicits higher physical responses. Other than pictures, words need to be processed more deeply and possibly ‘translated’ into a specific sensory representation before they can evoke a significant physiological reaction (Winkielman & Gogolushko, 2018). For this reason, the researcher chose the use of pictures to depict climate change manifestations to participants.

The analysis of the un-grouped participants identified that the feelings most frequently evoked by the climate change manifestations were sadness, anxiety, fear, and happiness. To explain the frequent occurrence of happiness among participants, based on the research of Keshavarz and Karami (2012), it could be assumed that it was selected as a tactical emotion to cope with the depicted climate change manifestation. However, those results could also indicate the multi-complexity of weather-related scenarios, showing that emotions are not one-sided but can also cause unexpected outcomes. The prevalence of the emotions sadness, anxiety, and fear are consistent with Hickman et al. (2021). They suggested that young people have rather

pessimistic views on climate change and experience high levels of climate and environmental anxiety. Those pessimistic feelings can further be observed when looking at the data analysis results of the individual groups. Furthermore, given that only the two pictures which depicted the climate change manifestation of wildfires elicited different emotions (**Table 2**), it could be assumed that the participants attributed their feelings to the pictures rather than the underlying climate change manifestations.

Age

The data suggest no major differences in the feelings prompted between the three age groups of 17-19, 20-22, and 23-25. As indicated by Coffey et al. (2021), younger people are overall more stressed about climate change than people over the age of 35; therefore, it is plausible that there might not be any significant differences in the emotional response to climate change within the younger generations. The emotions selected the most within those age groups were sadness, anxiety, fear, and happiness, with sadness being the most prominent. Specifically, the climate change manifestations of warming oceans and melting glaciers elicited sadness in all age groups. As both climate manifestations represent and are linked to climate change-related losses, it is in accordance with the literature that they provoke sadness in participants. This is because sadness is an emotion that frequently reflects the grief commonly experienced in response to climate change-related losses, also referred to as ‘climate grief’ (Cunsolo & Ellis, 2018; Phikala, 2020). Furthermore, the occurrence of climate anxiety is no surprise either, as Hickman et al. (2021) suggested in their research that young people are agonized by high levels of climate and environmental anxiety. This anxiety is triggered by the feelings of threats that climate change poses (Pihkala, 2022), which are depicted in the climate change manifestation pictures that were displayed to the participants.

Gender

Hickman et al. (2021) suggested in their research that women are especially more stressed about climate change; in contrast, the data analysis has shown that there are no major differences in the feelings prompted between gender groups. Nevertheless, these differences could also be traced back to the low number of male and non-binary/third-gender identifying participants, resulting in less representation and female-biased data. Sadness was the most prominent feeling elicited in participants. Melting glaciers and warming oceans are the climate change manifestations that both manifested sadness in all gender groups. As mentioned earlier, in accordance with research by Hickman et al. (2021), this shows the pessimistic views that young people have towards climate change, as well as the ‘climate grief’ that both melting glaciers and warming oceans trigger (Cunsolo & Ellis, 2018; Phikala, 2020).

Farmer Status

Similar to the data of the gender and age groups, the analysis of the farmer groups have not shown any major differences in the emotional manifestations of climate change within the groups. Again, sadness was the feeling most often prompted in the participants of both farmer groups. These feelings were elicited by the climate change manifestations of melting glaciers, wildfires, droughts, and floods. However, differently than in the age and gender groups, it can be observed that the feeling of anger was prompted. According to literature, anger is not only experienced by just causes but is also fueled by misconceptions about injustices (Pihkala, 2022). Farmers are particularly vulnerable to climate change manifestations that can lead to reduced crop yields or lower livestock productivity, such as droughts (*Climate-Smart Agriculture*, 2021),

as a result, it could be assumed that they feel more injustice when it comes to climate change, which in turn leads to anger.

Furthermore, as seen in **Figure 3**, precipitation elicited happiness in those involved in farming activities, while participants with no association with farming activities indicated sadness as the feeling. This difference could be traced back to the agricultural need for water and rain for crop yields and livestock, making precipitation a crucial weather phenomenon for farmers (Droogers et al., 2001). As described by Hayes et al. (2018), food and water insecurities count as indirect consequences on a person's mental health that have detrimental influences on stress, anxiety, PTSD, or trauma. The study by Connolly (2012) also suggested that more precipitation is associated with less sadness, stress, and tiredness, potentially evoking happiness in participants. However, this difference could also be associated with the phenomenon that if climate change affects a person directly, for instance, people that are involved in farming activities, different sentiments of feelings may be invoked than if a person is simply just passionate about climate change without being directly affected by it (Berry et al., 2011; Clayton, 2020; Haden et al., 2012).

As literature suggested, anger related to climate change may lead to more pro-environmental behavior as well as mobilization and engagement with activism (Pihkala, 2022; Stanley et al., 2021). Given that this suggestion is true, with fear and sadness being the most prominent sentiments in this research, we can expect that the young university students of Friesland will feel paralyzed by climate change rather than mobilized for action to become active with climate activism (Kleres & Wettergren, 2017). This is because sadness and fear are reflections of grief related to risk and threat perceptions that could hinder people from becoming proactive (Clayton, 2020; Cunsolo & Ellis, 2018; Pihkala, 2020; Pihkala, 2022).

Furthermore, the data analysis identified that the climate manifestation of frost elicited happiness in almost all groups. This could not just partially be traced back to the limited understanding of the climate change-induced impacts that frost have (Marquis et al., 2022) but also to people relating climate change to more extreme and visible events. In the Netherlands, these would mostly be droughts and floods (PBL Netherlands Environmental Assessment Agency, 2013). As Anthony Giddens (2009) refers to with the Giddens Paradox, some people find it difficult to recognize if and how the climate is changing because it often appears abstract or distant to them, especially because climate change is often confused with weather or seasonal changes. This could explain why in the described data, the emotion of happiness can be found.

Limitations

A key limitation of the study was to capture the climate change manifestations into pictures that appropriately represented them so that participants could know exactly what they were supposed to depict. As the researcher was limited to using copy-right-free pictures, this led to fewer picture choices to choose from. Therefore, it was difficult to reach people's emotions while simultaneously conveying the complex message of the impact that shows how extreme the extreme weather events really are. This was especially critical with the extreme weather manifestations of frosts and precipitation, as the pictures displayed normal rain and frost without looking very extreme. As a result, this might explain why those pictures, on average, prompted participants to select happiness as a feeling, besides the Giddens paradox described in the paragraph above.

Furthermore, the research only had a small sample size of 56 participants, as the surveys were not filled out to the end by more than half of the participants (62). When comparing the

three gender groups in the data analysis, this led to unequal distributions, as there were only two people in the non-binary/third-gender group, which may have led to the data not being representative (**Figure 2**). Additionally, the collected data was from a very small sample with the unique characteristic of them being university students. This could have led to self-selection biases, as the participants were a self-selected group of people, with the majority being from Campus Fryslân (78.6%), where sustainability and climate change are at the core of the bachelor program (*University College Fryslân: Global Responsibility & Leadership, 2022*). As a result, this could mean that the research cannot generalize the results to the broader population of young people in the same age group that live in Fryslân but do not attend university. Lastly, keeping the survey question that was asking participants to indicate their ethnicity an open question led to confusion among many participants resulting in very different answers, so the data could not be used for the analysis of the research.

Further Recommendations

This research made contributions to the already existing field that researches the psychological impacts of climate change by focusing on the younger generation living in Fryslân. As the literature review has shown, to this date, only limited research has investigated the mental impacts of climate change on young people because the focus has been on the older generations. Additionally, no research was previously conducted that explored those matters in Fryslân.

Future research should look more into the nuances of the less severe sides of emotions and feelings, as the tools used in this research only detected the most severe symptoms promoted by the different climate change manifestations. Especially because the already existing tools in

literature mainly look at the extreme sides of the clinical relevance of anxiety, there is a need to look at the specific sentiments evoked by it. In the further direction, research may also involve the intensity of the emotions in the descriptive analysis, as this research only focused on the emotions themselves without considering their intensities. Moreover, further research could replicate this study and apply it to different geographical regions, such as countries that might be more directly affected by climate change, to see how those circumstances lead to differences in the results.

In addition, the next stages of research could use a broader target group by including high school students and older people to research age differences on a broader scope. Or by particularly looking at Frisian citizens or people who have lived in Fryslân long enough to be or feel affected by climate change, as, in this research, only 48,2% of participants were Dutch, of which the actual percentage of Frisian people is unknown. Furthermore, to deepen the understanding of the differences between farmers and non-farmers, the research could consider having focus groups in which participants could directly discuss the matter of climate change and the effects it has not only on their life in general but specifically on their emotions. This will be beneficial, as this research and previous literature have indicated that different sentiments of feelings are invoked in people that are involved in farming activities compared to a person that is not directly affected by climate change (Berry et al., 2011; Clayton, 2020; Haden et al., 2012).

Conclusion

This research aimed to assess the type and intensity of feelings that different manifestations of climate change elicit in young people in Fryslân by answering the research question: *“Which emotions do different manifestations of climate change elicit in young people*

living in Fryslân, and with what relative intensity do these occur?” By doing so, the researcher explored which feelings are evoked by which climate manifestation while accounting for differences between gender and age groups and farming backgrounds.

The analysis identified that, in accordance with the literature, young people have not only pessimistic views on climate change but also experience high levels of climate and environmental anxiety. While no major differences in the feelings prompted by different climate change manifestations had been found within age, gender, and farming groups, it could be observed that sadness was the feeling most often prompted in the participants. The observed sadness was spawned by the manifestations of warming oceans and melting glaciers, as sadness reflects grief experienced as a response to climate change-related losses. Based on those results, it is expected that young people in Friesland will feel paralyzation rather than mobilization caused by climate change. This is because their feelings are primarily fear and sadness instead of anger, which has been described as mobilizing and leading to pro-environmental behavior by the literature. Lastly, while farmers' vulnerability potentially led to the observation of anger that was only shown in their group, their agricultural need for water for crops and livestock might indicate why precipitation elicited happiness in their group only. However, those results could also indicate the multi-complexity of weather-related scenarios, showing that emotions are not one-sided but can also cause unexpected outcomes.

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