

**Sex Differences and Helplessness in Climate Change Doomscrolling**

Luzie Grossekemper (s2519097)

Faculty of Behavioural, Management, and Social Sciences, University of Twente

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Supervisor: Dr A. Dominguez Rodriguez

2<sup>nd</sup> supervisor: Dr S. van der Graaf

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### Abstract

**Background:** Climate change – the rise in global temperature – poses a threat to all life on earth. Due to online news platforms and social media, information about climate change is available at any minute. Doomscrolling (DS) is the activity of excessive digital consumption of negative news. The phenomenon has not yet been examined with regard to climate change. Due to women being more affected by climate change than men, it is likely that they engage more in climate change doomscrolling (CCD). This thesis is concerned with sex differences in CCD and a possible connection to helplessness. **Methods:** A qualitative and a quantitative component were part of the current thesis. 15 candidates were interviewed about their news consumption regarding climate change. The results of the interview analysis were used to develop an instrument to measure CCD. Subsequently, 130 adults answered this new instrument and other instruments in an online survey. **Results:** Interviewees report that they feel most affected and drawn to read climate change news if they see news about catastrophes happening physically nearby themselves or a close person. Worry about future generation was also addressed. Several candidates report feeling powerless when confronted with climate change news. Only one candidate describes her past news consumption behaviours as excessive. Women engage in CCD more than men ( $b = .45, p = .008$ ). Resilience to helplessness has a negative relationship with DS ( $b = -.012, p < .001$ ). **Conclusions:** CCD seems more prevalent than DS and women are more affected by CCD than men. The new instrument for measuring CCD seems promising as it shows acceptable reliability and is normally distributed. It is recommended for use in future research.

*Keywords:* climate change, doomscrolling, helplessness, news consumption, sex differences

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## Introduction

Although climate change is a popular topic in the media and has repeatedly been called the greatest challenge humanity is currently facing (United Press International [UPI], 2005; Stapler, 2014), it remains unclear how the fast spread of climate-related news affects the users of social media and other news outlets. Within the mid-20th century, humanity entered the information age (Oralkan, 2019 as cited in IGI Global, n.d.), where information is readily available and spreads fast through [online] networks and mass media. With the arrival of Web 2.0 and – essentially – social media, our way of information-seeking is now very different from what it has been a few decades ago (“Web 2.0”, 2023). The world changes in other perspectives as well; with temperatures on the rise (National Centers for Environmental Information [NCEI], 2023), humanity is currently facing climate change and experiencing its consequences directly in the form of natural disasters that frequently make it into the news (Armstrong, 2023; Deutsche Welle, 2021; Fountain, 2020).

## Background

### *Climate Change*

Climate change is the general term for the phenomenon of long-term, consistent changes in global temperature (United Nations [UN], n.d.-b). Consequences include rising water levels, more frequent wildfires, storms, and floods, as well as the acidification of the ocean and the extinction of water and land species. The UN (n.d.-a) name resource-exploiting human activities, such as fossil fuel burning, as the main driver of climate change. Climate-change-related consequences are estimated to be responsible for the death of 13 million people in the last decade. Rising temperatures hold the consequences of lowered food supply and natural catastrophes destroying property, air pollution and increased physical health risks, possibly through zoonoses. Climate change has also increasingly been recognised as a driving factor for mental health issues (World Health Organization [WHO], 2021; UN, n.d.-a).

**Mental Health Impacts of Climate Change.** There is a lot of scientific evidence for the claim that climate change leads to decreased mental health outcomes in the population. Higher temperatures are one part that needs to be considered. A negative effect of rising temperatures on mental health has been discovered during a large study including two million United States (US) citizens. The negative effect on mental health was most prevalent in women; almost 1.6 times higher than for men (Obradovich et al., 2018). Moreover, rising temperatures in the US and Mexico have been linked to increased suicidal tendencies in the population (Burke et al., 2018). Beyond that, air pollution – one driving factor of climate change – has been linked to an increased risk of developing schizophrenia (Song et al., 2023). The main

greenhouse gas CO<sub>2</sub> (United States Environmental Protection Agency [US EPA], 2022) was not included in the analysis; it remains unclear whether it is associated with schizophrenia as well. However, pollution from other gases seems to be a threat to mental health.

Experiencing a climate catastrophe can itself yield threats to a person's mental health. Crane et al. (2022) presented evidence for the negative mental health impacts following climate catastrophes in a systematic review. There is substantial evidence for a higher risk of developing post-traumatic stress disorder (PTSD) after experiencing natural catastrophes (Palinkas & Wong, 2020; McMillen et al., 2002). Since climate change heightens the risks of natural catastrophes, PTSD cases could increase as an indirect consequence of climate change. In line with the results discovered by Obradovich et al. (2018), females seem to be more vulnerable to the development of PTSD symptoms than males after a catastrophe (Hrabok et al., 2020). Additionally, one study reported higher incidences of depression after the occurrence of Hurricane Sandy, which were persistent even one year after the storm (Schwartz et al., 2017). In the context of 2005 Hurricane Katrina, disaster-experiencing regions showed an increase in mental health issues, compared to non-disaster regions (Obradovich et al., 2018). Feelings of anxiety have also been linked to the acute occurrence of droughts and heatwaves (Cianconi et al., 2020 as cited in Crane et al., 2022). One study included in the review by Crane et al. (2020), reported heightened levels of anxiety, mood disorders, sleep disturbances, and even increased suicidality as a consequence of experiencing the impacts of climate change (Palinkas & Wong, 2020). Several risk factors exist for developing mental health issues after experiencing a climate-related disaster, such as being young, female, of low socioeconomic status (SES), being the first responder to a catastrophe, and having a history of psychiatric problems (Neria & Shultz, 2012; Palinkas & Wong, 2020).

The consequences of natural disasters, caused or intensified by climate change, can negatively impact people's mental state. The aforementioned mental health consequences arose after *experiencing* a natural disaster as a consequence of climate change. Evidence also shows negative effects on mental health outcomes, when people are merely *aware* of climate change's impact without being affected directly. Emotional impacts of climate change awareness can include feelings of guilt, helplessness, powerlessness, or anger. More severe consequences could be psychological distress, insomnia, anxiety, or depression (Boluda-Verdú et al., 2022).

**Sex Differences in Dealing with Climate Change.** The previously cited literature seemingly points in the direction that sex is one risk factor that is associated with mental health impacts of climate change. Being female is, hereby, a larger risk factor for suffering from the climate change, than being male (Boluda-Verdú et al., 2022; Neria & Shultz, 2012; Palinkas &

Wong, 2020). A systematic review displayed specifically the mental health impacts of the climate crisis in females (Rothschild & Haase, 2022). Several studies included in this review reveal that increases in domestic violence towards women, rape, and even femicides have been linked to rising temperatures (Auliciems & DiBartolo, 1995; McLean, 2007; Sanz-Barbero et al., 2018). Albeit mental health problems generally rising after experiencing a climate catastrophe, women seem to be more susceptible to developing PTSD, depression, and other mental health issues after a climate catastrophe, than men (Lowe et al., 2019; Neria & Shultz, 2012). This is also true when comparing the mental health of male and female children after experiencing such impactful climate events as a hurricane. Young girls are more affected than their male counterparts (Orengo-Aguayo et al., 2019). Women and younger people also seem to be at higher risk for developing *eco-anxiety* (Boluda-Verdú et al., 2022; Coffey et al., 2021 as cited in Rothschild & Haase, 2022). The term is used to describe “a cluster of emotional distress syndromes about climate impacts and the inadequacy of the human response” (Rothschild & Haase, 2022, p.416). Eco-anxiety is associated with poor mental health outcomes (Schwartz et al., 2022; Reyes et al., 2021) and impairment in several different life areas, such as concentrating, playing, sleeping and more (Hickman et al., 2021). Furthermore, ecological concerns are associated with a decreased attitude towards having children – especially in females (Arnocky et al., 2011; Miller, 2018; Hickman et al., 2021).

There is small evidence for the claim that women might be more at risk for mental health impacts of climate change because they tend to be better informed about climate change than males (McCright, 2010 as cited in Crane et al., 2022). Another reason for this tendency might be coping style. Women tend to show higher and more emotional coping reactions, which contributes to the development of several mental disorders, such as depression and anxiety (Matud, 2004).

### ***Helplessness, Depression, and Anxiety***

Generally speaking, depression and anxiety belong to the most widespread mental disorders worldwide. These disorders are more likely to develop in women – even without taking climate change impacts into consideration – and they are associated with reoccurring feelings of helplessness (Davey, 2014). The American Psychological Association ([APA], n.d.-b) defines helplessness as “a state of incapacity, vulnerability, or powerlessness associated with the perception that one cannot do much to improve a negative situation that has arisen [...]” The APA (n.d.-b) also stresses the role of *learned* helplessness in the pre-clinical stages of certain mental disorders. Learned helplessness can be a contributing factor in the development and acquisition of depression and anxiety (Davey, 2014; DeSalvo, 2019; Silveira & Joca, 2023).



People who are struggling to cope with feelings of helplessness might be more vulnerable to developing a full-blown depression and/or anxiety disorder (Davey, 2014). Feelings of helplessness can often arise in the climate-related context (Norgaard, 2006).

### ***Doomscrolling***

As an attempt to cope with feelings of helplessness when facing the climate crisis, people may turn to social media and other news outlets. They might do so, in an attempt to gain a sense of control over their situation by surveilling the latest news (Groot Kormelink & Klein Gunnewiek, 2021). This coping attempt may lead to the phenomenon of *doomscrolling* (or *doomsurfing*), in which a person engages in extensive online searches for bad news about a specific topic, regardless of the negative feelings these searches may produce (Merriam-Webster, 2020).

Literature about doomscrolling with regards to climate change news is scarce – currently, there exist no studies about the consequences of doomscrolling through climate change news. However, doomscrolling itself might be an older phenomenon that is termed differently but has the same meaning as compulsive news checking; the term *doomscrolling* was first used in research in 2021 (Ytre-Arne & Moe, 2021) but older studies have investigated compulsive news-checking behaviours. Already in 2006, Diddi & LaRose showed that consumption of news media is positively related to the need to stay informed; a need that also plays a role in doomscrolling (Groot Kormelink & Klein Gunnewiek, 2021). The authors mention *escapism* as one reason why the participants engage in heightened television news consumption. The participants' need to be informed about current events, positively correlated with the consumption of classical print media but also digital news outlets (Diddi & LaRose, 2006). This might indicate that doomscrolling behaviour existed with previous media outlets before online news portals and social media became popular.

Shabahang et al. (2021) suggest, that dynamics similar to addiction could play a role in exaggerated news checking, whilst fear of missing out and future anxiety play a role in compulsive online behaviours. Moreover, social media plays a large role in connecting people to news outlets (Sismeiro & Mahmood, 2018; Husin, 2018). Social media algorithms detect the interest of users, which then confronts users with even more news regarding the topic of current interest. The creation of such *filter bubbles* or *echo chambers* has been known in research for a longer time (Sonoda et al., 2018) and social media could, thus, enhance compulsive news checking (Sismeiro & Mahmood 2018). Even though the phenomenon itself has been investigated before, the term *doomscrolling* is new in clinical research, especially with regard to climate change. However, doomscrolling was well investigated in the context of a different

crisis; the Covid-19 pandemic. Studies about doomscrolling in the Covid-19 context reveal meaningful insights into the consumption dynamics that media users display when being confronted with negative news.

**Doomscrolling in the Context of Covid-19.** Covid-19 related information on social media was viewed more frequently than on other news media during the first lockdown. Researchers assessed the relationship between mental health impacts and doomscrolling, suggesting that depression and PTSD symptoms were more pronounced in the sample on days with higher social media consumption (Price et al., 2022). A similar effect was also revealed in a study to test a new instrument to measure doomscrolling; the Doomscrolling Scale (DSS). Low rates on the DSS were linked to higher age and higher SES. These results suggest that vulnerable groups, such as younger people and lower SES citizens, tend to engage in doomscrolling more frequently. Sex, however, was not a risk factor for doomscrolling in this study (Satici et al., 2022).

With regard to the Covid-19 crisis, Groot Kormelink and Klein Gunnewiek (2021, p.676) state that “the news is simultaneously a source of fear and comfort.” Some people developed compulsive behaviours of reading news, which was then termed *doomscrolling* in research. Mental health impacts and feelings of being overwhelmed were widespread reasons for avoiding news during later phases of the pandemic. Some people perceived the constant negativity as emotionally draining and distressing (Mannell & Meese, 2022; Ytre-Arne & Moe, 2021). People were developing strategies to balance their desire to stay informed with the need to protect their mental health (Mannell & Meese, 2022).

Covid-19 and the early lockdowns were experienced as very sudden disruptions in people’s daily lives (Groot Kormelink and Klein Gunnewiek, 2021), whereas the changes caused by climate change occur slowly and gradually, and the reality of the situation might be harder to grasp. Whether compulsive checking of climate change news – similar to early pandemic behaviour – exists, remains unclear due to lack of research. The current study aims to close this research gap about climate-change related doomscrolling in vulnerable populations.

### ***Rationale***

No literature is currently available about doomscrolling in the climate-related context. Since the consequences of climate change are likely to increase in frequency over the next decades (Arias et al., 2021), it is important to gain insight into the mental health implications as early as possible. Because the current study is primarily an exploratory study, it follows a mixed methods design, entailing a qualitative as well as a quantitative section. Integrating two

different methods of data collection yields the advantage of having a broad and detailed first insight into an unexplored topic. Hereby, the results of the qualitative component will be integrated into the second component by designing an instrument specifically intended to measure climate change doomscrolling. This instrument will then be answered by the larger, quantitative sample and explored in detail using statistical analyses. Both study components aim to answer the main underlying research question “(How) is doomscrolling about the climate crisis related to heightened feelings of helplessness in the two sexes?”. The thesis is part of a larger research project, executed together with three other researchers; all theses explore slightly different research questions.

As aforementioned, research showed that sex was not linked to doomscrolling in the Covid-19 context (Satici et al., 2022; Sharma et al., 2022), which is the only scientific context in which doomscrolling has been explored until now. Anyhow, researching doomscrolling in the climate change context might reveal something different in this respect. As aforementioned, women seem more susceptible to the mental health impacts of climate disasters (Crane et al., 2022) and eco-anxiety (Boluda-Verdú et al., 2022), and tend to be better informed about climate change than males (McCright, 2010 as cited in Crane et al., 2022). This might indicate a higher tendency to engage in climate change doomscrolling. Consequently, sex as a contributing factor is included in the current study and the first hypothesis for the qualitative study is formulated as *hypothesis 1 (H1): Females engage in doomscrolling more than males*. Relatedly, women are also at higher risk for developing depression and anxiety disorders (Davey, 2014). Because feelings of helplessness play an important role in the development of these mental disorders, helplessness will also be a main point of investigation in the current study. Thus, *hypothesis 2 (H2)* states that *doomscrolling is negatively associated with the ability to cope with helplessness* and *hypothesis 3 (H3)* combines the two main variables of interest by stating that *the negative effect of coping with helplessness on doomscrolling is stronger in males than in females*

## **Study 1**

### **Methods**

This method section was written accordingly to the COREQ checklist, developed by Tong et al. (2007). The checklist is specifically written for structuring qualitative method sections. Since all four researchers have a limited amount of previous experience with writing qualitative method sections, using the list was considered helpful to remain a clear structure. For a comprehensive list of all criteria from the COREQ checklist and where to find each criterion in the current method section, please consult Appendix A.

### ***Research Team & Reflexivity***

**Personal Characteristics.** All four researchers conducted the interviews. Two were male and two were female. Three researchers were German and one was Dutch. All researchers were third-year B.Sc. Psychology students from the University of Twente. The researchers received training in conducting interviews during their Bachelor's program.

**Relationship with Participants.** Due to the sampling methods, some of the researchers had a relationship with the interviewees before conducting the interview. To avoid bias, the researchers only interviewed candidates who were strangers to them. All interviewees knew about the purpose and the topic of the interview before data collection started. All interviewees were aware that the interview was part of a Bachelor's thesis and the researchers conducted the study in order to obtain their degree. The participants did neither know the general research question, nor the individual research questions of each researcher/interviewer.

### ***Study Design***

**Theoretical Framework.** Since the current thesis is an exploratory study, the researchers started from scratch after the data collection. The theoretical framework for data collection and analysis was *thematic analysis* according to Braun and Clarke (2006). Since thematic analysis is a very flexible framework, the researchers agreed in advance that the thematic analysis will be executed in a specific way. More precisely, the analysis was (1) focusing on one specific part of the data (doomscrolling), (2) inductive, (3) focusing on semantic themes, and (4) following an essentialist/realist epistemology.

**Participant Selection.** The researchers used a mixture of snowball and convenience sampling as a recruitment strategy for the interviews. Participants were recruited over a period of 10 days from March 18<sup>th</sup> 2023 until March 28<sup>th</sup> 2023 via advertisements that the researchers and their supervisors uploaded on their social media accounts. Because German and Dutch adults were the target population of the study, the advertisement was only available in German or Dutch (see Appendix B for the German version). Since the advertisement was distributed via social media, mostly friends and family of the researchers responded to it. The researchers corresponded with the applicants via email and decided whom to include based on the premise, to have an as diverse sample as possible; especially regarding age and sex. Participants were excluded if they (1) were underaged (< 18), (2) were currently receiving treatment or medication for a mental disorder, or (3) had a suicide attempt within the last two years. Candidates with these criteria were screened out before the interviews started. Participants were included in the study if they (1) were adults ( $\geq 18$ ) and (2) living in Germany or the Netherlands.

The researchers were in contact with 18 potential participants. Three participants did not respond to the requests and were, thus, excluded from participation ( $n = 15$ ).

**Setting.** The informed consent form was sent to the participants via email before the start of the interview (see Appendix C for the German version). It was then signed digitally by the candidates and sent back to the researcher who conducted the interview. Both participants and researchers participated from home. The participants received a link to a *Microsoft Teams* (version 1.6.00.7354) online meeting, which they entered by clicking on the link. During the interview, only the researcher and the participants were present. In the sample, there were 9 males and 6 females from Germany and the Netherlands. The age range was 20 to 59 years with 35.6 as the mean age. All candidates in the sample were white, there were no other ethnicities represented.

**Data Collection.** The interview questions were developed by the researchers themselves, based on pre-existing literature about doomscrolling, climate change, and several different mental health aspects. These aspects of mental health were *depression*, *anxiety*, *helplessness*, and *social support*. The questions in their predetermined order can be found in Appendix D. The interviews were semi-structured and, thus, some follow-up questions, that were not determined before, arose during the course of each individual interview. Due to time constraints, the interview procedure was not pilot tested. In the beginning, the researcher thanked the interviewees for their participation, explained to them the purpose and procedure of the study, asked them for consent to record the meeting, and started by asking them the interview questions. The researchers did not take notes during the interview but they asked additional questions to the predetermined questions if a statement of an interviewee was considered worth exploring more in-depth. All interviews were audio-recorded for later analysis. There was a considerable difference in the length of the interviews. The longest interview lasted 44.29 minutes, whilst the shortest lasted 14.47 minutes. On average, the interviews lasted 24.50 minutes. The audio recordings of the interviews were transcribed and the transcriptions were translated to English so that each researcher was able to understand each interview. The transcripts were not returned to the participants for confirmation since the recordings confirmed what was said.

### ***Analysis and Findings***

**Data Analysis.** Transcripts were uploaded to ATLAS.ti (version 23.1.0) and analysed using the inductive thematic analysis approach. Every member of the research team analysed each interview, which corresponds to four coders for each interview. Codes were derived directly from the data and not agreed upon in advance. The larger themes derived from the

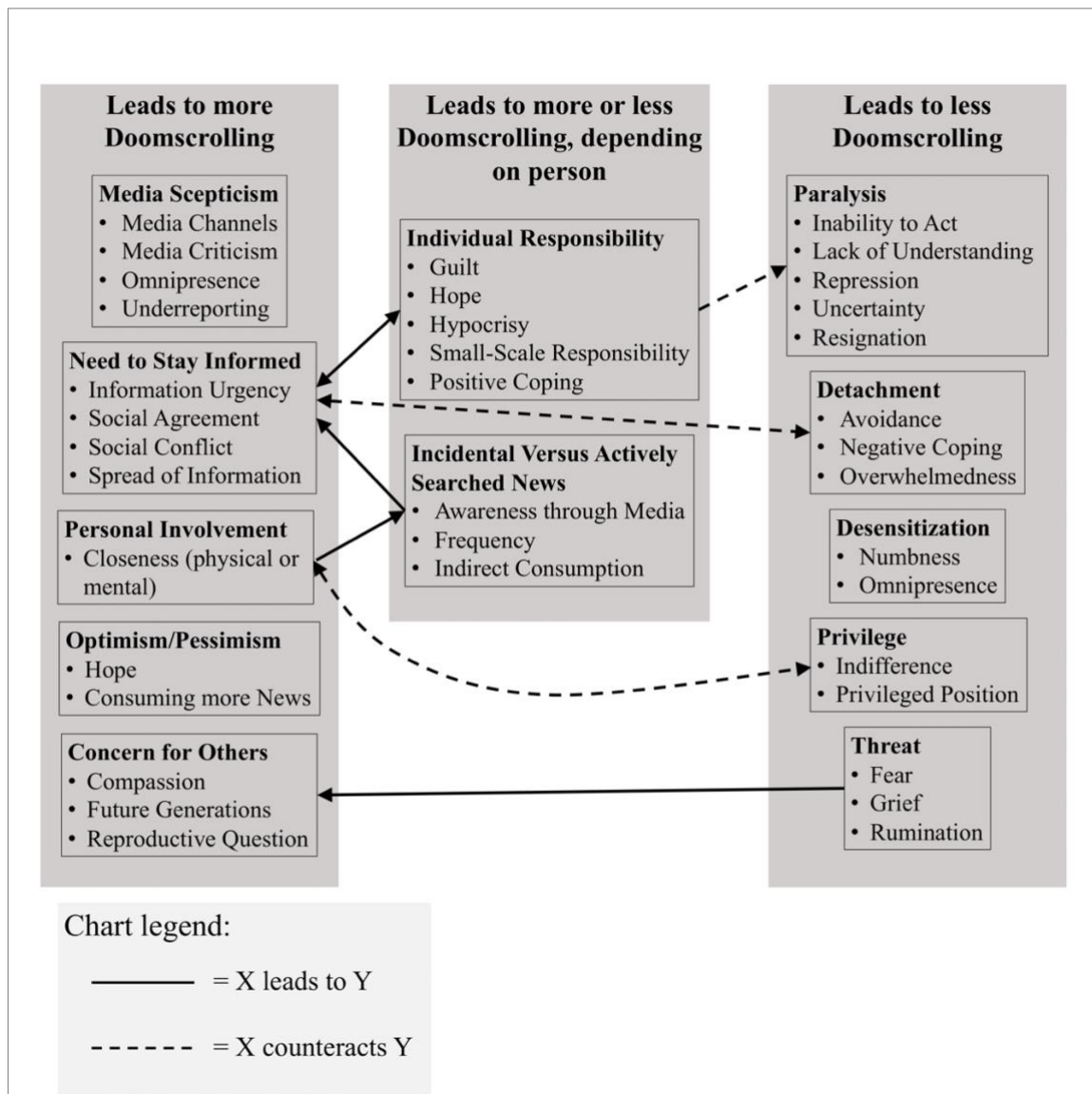
individual codes were agreed upon by the researchers together. For the current thesis, 40 codes and 14 themes were identified and schematically represented in a coding tree (see Figure 1 on page 15). Due to time constraints, the participants did not provide feedback about the findings but were informed about the results of the thematic analysis.

**Reporting.** Each theme is illustrated by one or more quotation that captures the essence of the theme. Each participant received a number to identify them and their corresponding quotes but keeping anonymity (see Table 1). Small inconsistencies between data and findings occurred because individual responses from different participants sometimes contradicted each other but were still regarded as belonging to the same overall theme. If this is the case for a specific theme, it is addressed in the results. Minor themes will not be reported in the results.

**Table 1**  
*Participant Numbers and Demographics*

<b>Participant No.</b>	<b>Sex</b>	<b>Age</b>
<b>1</b>	m	54
<b>2</b>	m	56
<b>3</b>	f	21
<b>6</b>	m	26
<b>7</b>	f	26
<b>8</b>	m	22
<b>9</b>	f	20
<b>10</b>	f	57
<b>11</b>	m	54
<b>12</b>	f	24
<b>14</b>	m	49
<b>15</b>	f	23
<b>16</b>	m	22
<b>17</b>	f	21
<b>18</b>	m	59

*Note:* Participants 4, 5, and 13 are missing because they stopped responding to emails

**Figure 1***Coding Tree with Relationships between Relevant Themes*

*Note:* The bullet points below each theme describe the individual codes that make up the specific theme for the current thesis. Differences between those codes compared to the other three theses are possible due to individual coding in thematic analysis. *Resentment towards the System* is not included due to a lack of connection to news consumption and doomscrolling. All themes within one box can be a cause of one another since similar dynamics are visible in each of them.

## Results

In this section, the results of the qualitative analysis will be presented per theme. Often, different themes showed overlap with each other or were consequences, i.e., preconditions of each other. Relationships between the themes will be described if deemed relevant to the overall

issue of climate change doomscrolling. Due to space constraints, the codes entailed in each theme will not be discussed. Rather, the essence of each theme will be described and illustrated using the most relevant quote(s). Out of the 13 themes that appeared during the analysis, 12 were considered relevant with regard to the topic of doomscrolling and climate change. The additional theme was labelled *Resentment towards System* and was more related to climate change in general. A brief description of this theme can be found at the end of the results section.

The order in which the themes are presented is not related to any hierarchical order but to the number of quotes included in each theme. The most prevalent theme was *Paralysis* with 129 quotes, followed by *Individual Responsibility* with 124 quotes, and *Media Scepticism* with 74 quotes. See Table 2 for the frequency of the other themes in the data.

**Table 2**  
*Frequency of Each Theme, Measured by the Number of Corresponding Quotes*

Theme Name	Quotes
Paralysis	129
Individual Responsibility	124
Media Scepticism	74
Need to Stay Informed	54
Concern for Others	53
Detachment	52
Incidental vs. Actively Searched News	49
Optimism/Pessimism	45
Threat	45
Privilege	34
Personal Involvement	29
Desensitization	26
(Resentment towards System)	(82)

***Paralysis***

The most prevalent theme in the current interview sample was *Paralysis*. All participants, in one way or another, expressed how the uncertainty revolving around climate and the expression of seemingly unsolvable climate issues in the media, lead to a feeling of powerlessness. More even, it was expressed that a certain paralysis was felt by the participants, they expressed that they felt as if they were unable to do anything to make the situation any better; they felt helpless. The uncertain future that is portrayed by media reports about climate



change impacts, can cause resignation and less engagement with such reports in general because it is experienced as *useless* and *leading to nothing*. Seven participants even went as far as stating that they actively repressed or pushed away thoughts about climate reports because they were otherwise unable to deal with the seeming inability to do something against climate change. Participant 12 demonstrates the relationship between the media portrayal and resulting feelings of powerlessness; “Well, because the way that it is shown is mostly negative, I do feel discouraged to do something about it. It feels like it is out of my power, there is not really anything that can be done still.” Participant 8 – who is of similar age – expresses how media reports made him feel insignificant in facing the topic of climate change. “I think, if I do, then I just think, what can I do about it and then I feel... almost unimportant.”

From both quotations, it is clear, that the participants feel stuck in a situation, from which they are seemingly unable to escape because the overall causes of climate change seem to be outside of their power. In the many expressions that this theme covered, it became apparent that this feeling of being stuck – the paralysis – was causing participants to refrain from the consumption of climate change news. A certain process of climate change news consumption became apparent as well; through the perceived powerlessness of one’s own actions – amplified by negative media reports about ineffective measures – the participants repressed the topic more. Ultimately, this was leading to the opposite phenomenon of doomscrolling in some participants; news avoidance.

### ***Individual Responsibility***

Through climate change news, people were more aware of their own contribution to climate change; all participants except one mentioned what they themselves did to avoid contributing to unnecessary greenhouse gas emissions and what actions they took to act ecologically conscious. It was seen as a moral obligation or a responsibility to contribute something against climate change. Often, these were behaviours such as consuming less meat, and buying less plastic – especially amongst the younger participants. For seven participants, this was a positive way of coping with the feelings of powerlessness against climate change. Three of them also mentioned that making other people aware of the issue and aware of the actions that every individual can take against climate change, helped them with dealing with the *Paralysis* that they experienced. In general, the media seemed to make the participants aware of their negative impact on the climate, but also aware of the small contributions that each individual could make. Participant 10 refers to a Netflix documentation as an information source rather than a news portal but still experiences this awareness:

“And then I watched it on Netflix for an hour and a half, no, and after that, I didn’t feel so good. But I think you just have to do that in order to see for yourself, what I can do on a small scale to change that. I probably can’t make much of a difference on a large scale.”

Overall, the participants seemed very aware, that a small contribution from a single person has its limits if other people do not contribute to the environment in the same way. Feelings of guilt were also expressed, when thinking about one’s own actions that are contributing negatively to the climate, such as driving the car to the next grocery store. Participant 15 points out the hypocrisy of this situation;

“For example, with a vegan lifestyle, you think that you are already doing a lot because you are avoiding a lot of greenhouse gases from animal husbandry. Yes, and then you always pat yourself on the back a little and say, ‘*Yes, I’m doing this and that.*’ So, I think people want to play down their own contribution, which they do have, and often push it onto higher levels.”

Shifting the blame away from oneself, as this participant portrays it, was not commonly expressed by the participants but they seemed aware that the scope of their *Individual Responsibility* has its limits if other people do not act accordingly. Whether doomscrolling was enhanced or decreased by this, was not possible to establish and was heavily dependent on the individual participant. Thoughts about one’s own climate contribution generally seemed to be a consequence of media consumption, not a cause of it.

### ***Media Scepticism***

Doubts and criticism about media reports and media outlets were frequently expressed by the participants. Eight participants were sceptical about the seemingly omnipresent scaremongering that different media outlets distribute. Participant 9 summarizes the media reports and her corresponding feelings;

“[...] if you then see or read the news where it’s the same... somehow, it’s calculated for you, when exactly something isn’t going to function anymore or when any resources, for example, would be used up if we would continue like this like now, I find it a bit discouraging.”

On the other hand, six participants held a contradicting opinion. They stated that the media did not report enough on the fact, that natural catastrophes were an effect of climate change when a recent catastrophe was reported about. Participant 17 also holds this opinion and clearly stresses this by saying;

“I have the feeling that the event is of course in the foreground, first of all. So, the flood or the earthquake, because there are a lot of human lives involved and a lot of their own little stories and that it’s not like at first, well, *that’s the result of climate change*. And then I think it depends a bit on which, well, which sources you read through, I think.”

Here, the participants were well aware that different impressions of media reports were depending on what kind of media channels one consumes. Noticeably, younger participants were almost solely referring to the social media channels of established media outlets, such as the German *Tagesschau* on Instagram, whilst older participants were referencing TV outlets, online newspapers, and printed newspapers. *Media Scepticism* was, however, always expressed with regard to the media as a whole institution, without much differentiation between single outlets. Doubts about the accuracy of reports and the intentions of certain media channels led to searching for alternative sources in some of the participants. The connection to doomscrolling, however, seemed marginal.

### ***Need to Stay Informed***

Staying on track with recent information about what is going on in the world seemed to be a motivational aspect for the participants to engage in consuming climate change news. Six participants described that specific headlines or news articles led them to engage in further searches about the topic, whilst three participants expressed that talking to people in their environment was the primary motivational driver. What they had in common was the need to be up-to-date with the latest developments due to a feeling of being uninformed or not knowing enough about the current topic. For this theme, the connection to the theme *Personal Involvement* is quite clear, since conversations with close ones sparked the desire to learn more about a specific climate-related topic. Participant 17 addressed how she felt uninformed about the newest climate change developments since her sister is apparently more involved in the topic than she is.

“It comes, well, mostly somehow, when I’ve had some conversations about it, for example, and I noticed that I don’t really know what’s what at that moment. So, it’s often with my sister, for example, because she’s totally informed about it, or from my mother, and I then notice that I don’t know what the latest report said right now... that’s mostly where it is coming from.”

Apparent from this statement is, that hearing new information from a close person can lead to further information searches. However, participants also reported that the opposite

dynamic was prevalent in their social group; they wanted to exchange information with people *after* reading current news that stuck with them. Six participants said that they wanted to confirm their opinions about certain climate change news and, thus, turned to friends and relatives to find out whether they agreed. On the contrary, nine interview candidates also reported that talking about climate change issues to certain people in their environment would lead to disagreement and conflict. Six out of these nine avoided bringing the topic up in that specific social circle.

From the descriptions of the participants, it seems that the relationship between the social exchange of climate change news and the consumption of such news is bidirectional; both can cause each other. Thus, people who talk to others more often might also be more prone to engage in deeper searches for specific news.

### ***Concern for Others***

Within the interviews, it became clear that many participants are concerned for other people in their environment when reading about climate change news and especially the devastating impacts that climate change could have on humanity. Empathetic responses were visible towards others' suffering and also about future generations and what they potentially will have to face when climate change continues. Five participants were also concerned with the particular question, of whether it would be an ethical decision to bring children into this world, who would then have to face the consequences of climate change. One of them – a younger, female participant – openly stated that her decision to remain childless was determined by the threat of climate change and its unforeseeable developments in the future. Depending on the individual participant, such empathetic concerns were caused by reading climate-change news but for a few participants, they were contrastingly a *reason for* consuming more news about climate change. Participant 17 addresses how news about climate catastrophes makes her feel towards other human beings who could face climate catastrophes in the future;

“Yes, so anxious because. I’m just worried about what could happen to me. What else could I experience. Also, because I... tend to be afraid for my fellow human beings and also, of course, if, well... the next generations, of course, I’m also afraid when I, somehow, I don’t know... see friends who are having a child or something.”

The expression of not only concern but blatant fear for others' mental and physical well-being, especially for vulnerable people, shows the impact that climate catastrophes can have on human emotions. The particular concern for future generations shows, that participants generally expect the situation to worsen and not to get better. The quoted participant also

stressed that she stopped reading news about climate catastrophes after a period of extensive consumption of such news. For this reason, her example shows that *concern for others* can cause or enhance the consumption of climate change news.

### ***Detachment***

The majority of the candidates in the sample reported that the sheer confrontation with climate change news sometimes led to an avoidance reaction; 12 participants reported that they mentally detached themselves from climate change news after reading them, which also led to avoidance of searching for more news. Participant 17 highlights how she experiences the influence the news has on her mental state and how refraining from news consumption helped her to cope with this;

“Right... and I’ve always... well, it wasn’t like that in the past... but over time it’s also often, when I’m somehow stressed in everyday life or something, that I have the feeling that I’m somehow then actively trying to push it away and avoid it and just keep scrolling so as not to occupy myself with it for so long, because I often had the feeling that when I was busy with these topics, I then... yes, I then ruminated in my head a lot more and then I kind of get in a bad mood.”

By *keep scrolling*, it can be seen that the participant refers in particular to climate change news that gets recommended to her on social media. In a less excessive form, this behaviour was also described by other participants. They described tendencies to detach themselves mentally from the negative news they have read or tendencies to avoid consuming climate change news altogether. Eight of the participants felt overwhelmed by the negativity of the news, which the participant quoted above stresses by expressing how *ruminating* led to the decision to avoid news consumption. Moreover, four participants described this mental mechanism as a form of coping with the negativity that was presented by the news. From the descriptions of the participants, it seems that being overwhelmed by negative news can lead to active news avoidance after a period of news consumption.

### ***Incidental Vs. Actively Searched News***

During the interviews, it occurred that a distinction needs to be made between news that is actively searched for and news that the participants just noticed because it was presented by the current media outlet they were using. Especially the participants who were consuming most of their news via social media reported that they often saw more climate change news after a catastrophe, simply because it was distributed more by the social media channels. Participant

12, who consumed the news mainly via online news portals, also noticed an unconscious increase in consuming climate-change news if there was a current event related to it.

“I don’t look for it or read it more often on purpose, but it does pop up more. For example, when the weather is super hot but it is not supposed to be that hot, I noticed news about it more often but I do not find myself looking for it more often.”

Some of the participants were aware of the effect that the spread of information by the media, especially breaking news, has on their consumption behaviour. Skimming through the articles because the topic was more prevalent, was described by five of the candidates in the sample.

Moreover, the mere awareness of climate change stems from news consumption mostly, because 14 of the participants stated that they had not experienced any climate catastrophe themselves. 12 participants directly stated that they were aware of climate change through the media. Only three of the participants stated that they were actively searching for news when climate change topics were suggested to them more often. Participant 17 was the only one in the sample who openly stated that her climate news consumption had been excessive at one point in the past two years;

“Well, it was really like that, that I was at the university, or I was in the canteen and I kept doing in between... did I go online and had a look at it or I even remember... that’s right, I even watched a live stream of them while I was studying, while I was studying for uni. Well, simply because I was so interested, it was just a live stream and I knew I couldn’t look it up or anything, uh, right. Well, I don’t know when it is excessive, when you can call something excessive, but it was a lot.”

The participant’s description of this behaviour came close to the definition of doomscrolling. The participant was unable to refrain from reading or following the news, even when there were other responsibilities to focus on. Because the participant is describing the scenario in the past tense, it can be assumed that this behaviour does not occur anymore. This was confirmed by the participant later in the interview – she noticed that her news consumption was too much and then actively decreased it.

Since the other participants did not state such behaviours, it might be possible that *actively* searching for news in the first place, heightens the likelihood to engage in doomscrolling. Being merely aware of climate change news, however, does not seem to have this effect, as no other participant reported such dynamics.

### ***Optimism/Pessimism***

People's motivations to engage further with a climate change topic that they had seen in the media, were very different. The most prevalent motivation to search further was *Personal Involvement*, which is why this motivational aspect was considered an independent theme on its own. Apart from personal involvement, the motivations for deeper searches into one topic were very individual for each candidate. Here, the line can be drawn to the *Need to Stay Informed* theme, in which feelings of being uninformed lead to heightened motivations to research topics. In the *Optimism/Pessimism* theme, however, the motivations for information seeking were less neutral than simply an urge to stay up-to-date. The motivation was a direct consequence of a positive or negative reaction to specific news. For one candidate, for example, the motivation came from a *pessimistic* point of view, as he states that he wants "to know if it is really that bad, so [I] look for more articles and different sources to see if I can confirm or reject my own thoughts." However, only three additional candidates reported that their motivation came from a negative feeling. For three other candidates, the motivation to dive deeper into a topic stemmed from a more *optimistic* perspective. When they saw or heard reports in the media about ecological projects and other *positive* climate-related news, that motivated them to look more into those projects. Participant 8 describes it like this;

"Well, if I have the feeling... that something can be done about it, I think [...], if I hear about any projects that counteract this or something like that, then I might dig a little deeper and see that I find out how, how big the whole thing really is now."

Generally, it was visible that the motivations to gain more knowledge about a certain climate change-related topic were diverse and different for each person. Some felt more motivated by discouraging news to confirm their (negative) thoughts and some, on the other hand, were more motivated by a hopeful glimpse into the future.

### ***Threat***

Climate change poses a large threat to humanity, in a scope that has never been recorded before in human history. Through the media, people become more aware of the *Threat* that climate change poses to our physical and mental health. In relation to this theme, participants addressed specific emotions that they connected to the felt threat, most often these were fear and a certain kind of grief, specifically targeted at feeling sad about "what is going to happen now with our actually very beautiful planet", as one participant stated. Other participants described this as a general *uneasiness* that was felt when thinking about the topic of climate change itself.

The role of the media was less pronounced in statements related to this theme, but participant 8 verbalized, how rumination about climate change topics led him to read more into these topics, even if it only happened occasionally.

“I don’t know what the alternatives are... and that’s why I think I’m, well, worried and consider the consequence like then I, I read about the consequences of climate change, I would say. That’s what causes worry because, because you don’t know what kind of an impact that’s having on other people... on you personally.”

Whether the felt threat leads to more or less consumption of climate change was, apart from the above-cited participant, not clear from the statements of the other participants. Nine participants mentioned discouragement and even fearful thoughts because of the threat, which could possibly lead to withdrawal from news, similar to the dynamics described in the theme *Detachment*, where the sheer overwhelmedness and omnipresence of the topic ultimately caused withdrawal from news sources.

### ***Privilege***

In *Privilege*, it is expressed that climate change news is easier to blend out or ignore because the participants are privileged enough to not have experienced a heavy catastrophe just yet. The following quote by participant 6 highlights how the participants were very aware of their concurrent privilege to live in a relatively safe region of the earth;

“Maybe also because I don’t really feel or experience the climate change, like I don’t see it happening really. Maybe also because I live in the Netherlands. I probably see the big changes more in countries further away from us.”

But especially the older participants were also aware of the privileges they experienced during their youth when the consequences and media reports about climate change were not as present as they are today; “When you are younger, you may be more inquisitive and want to see other countries. Thank God I was able to experience... and I was able to do it all.” One older participant also talks about the privilege to be able to do something against climate change – as families from low SES backgrounds often cannot afford eco-friendly products or be conscious about the climate for every financial decision.

Nevertheless, privilege seemingly made it easier for the participants to withdraw from the topic. As long as climate change is not close to the individual – as long as the human is privileged – it might be easier to disengage from a topic and possibly also to feel indifferent about it.



### ***Personal Involvement***

Although a less frequent theme, the role of *Personal Involvement* in climate change doomscrolling, was expressed by nine of the 15 participants. This theme was thematically close to the *Privilege* theme, because it also touches on the phenomenon of only being interested in news that affects oneself or people close to oneself. However, *Personal Involvement* can be seen as the opposite side of *Privilege*, since it was the theme, most clearly linked to an increased motivation to consume news. Therefore, it is also strongly connected to the *Optimism/Pessimism* theme and, moreover, seems to be a cause of even this motivation to turn to the news. This becomes clearer in the context of reading about a specific climate catastrophe. Participant 11 explains it in more detail:

“Unless it concerns me. Would [climate change] affect me personally for any reason that it’s happening regionally or that it’s happening anywhere. We have friends in America, for example... if, there... if I read about someone there, for example, a snowstorm or something similar, and I mean America is big, then, of course, I go deeper and ask myself where is that, what’s happening there right now and so forth? But there has to be a personal connection. Otherwise, I won’t go deeper into this whole topic.”

It becomes clear that not only physical proximity plays a role in the motivation to engage in deeper searches about recent climate catastrophes, but also the felt proximity to people who are close to the participant. By *going deeper*, however, participant 11 does mean the activity of doomscrolling, which is mostly encouraged by endless scrolling on social media feeds, but he refers to an active, conscious search for information on the internet. Felt or actual proximity to a recent climate catastrophe might enhance the interest in the topic and facilitates a person to research more about it. Here, the connection to *Privilege* becomes clear. Doomscrolling is more likely and dependent on a physical or emotional connection to the specific news – it is dependent on *Personal Involvement*. If the reader is privileged enough to feel less connected to a specific news headline, doomscrolling is less likely.

### ***Desensitization***

*Desensitization* is a theme closely related to *Detachment* and has similar effects but the causes and motivations are slightly different. In the description of *Detachment*, it seems evident that the negativity of the news leads to people avoiding the consumption of climate change news or detaching themselves from the topic in general. In *Desensitization*, the sheer omnipresence of climate change news, causes people to become less sensitive to the topic and

pay less attention to it. Climate catastrophes might then be perceived as less severe because people get used to shocking reports and images in the media. Because this was the least frequent theme, only four participants expressed experiences related to desensitisation. The omnipresence of climate change news, however, was addressed by seven participants.

Precisely, participant 11 was eager to compare desensitization to negative climate change news with the general psychology of human nature;

“But, like many things that are fed in too much by the media, will eventually no longer be important... In the sense of being ignored and then gladly left it to ourselves... Oh, again, that we are, yes, we are used to consuming breaking news all the time.”

This participant addresses how humans respond more likely to new information and quickly become used to old information and pay less attention to it. This is not only the case with mental processes but also occurs with the most basic psychological functions of interpreting sensory input – a process referred to as *habituation* (APA, n.d.-a).

At first, it may seem counterintuitive that increasingly negative news reports about climate change might lead to less involvement from the audience. Nevertheless, *Desensitization* describes one plausible mechanism through which less consumption of climate change news – despite the omnipresence of the topic – could be explained. It, thus, relates to the theme *Detachment*, which describes similar mechanisms.

### ***Resentment towards System***

Despite this theme having no connection to the doomscrolling topic, it is important to explain the theme briefly, as it was detectable among all participants to a certain degree. Participants stated how it was frustrating that acting ecologically friendly as an individual person was *useless* if big, globally-acting companies and other nations worldwide are not willing to change. Policy-makers were criticized for making no changes at all or for making irresponsible or even contra-productive changes concerning the climate. It was also criticized how the current economic system is not sustainable or eco-friendly at all. 4 participants were upset about the unfair treatment of climate activists, such as Greta Thunberg. Moreover, 4 of the participants were upset about climate-change deniers and their disregard for this important topic. Overall, this theme covered a lot of frustrations that were visible in the interview sample and these emotions were enhanced by media reports about climate politics, global climate issues, and issues with big companies polluting the earth but the theme itself was not directly related to doomscrolling.

## Study 2

### Methods

This method section was written accordingly to the APA 7<sup>th</sup> edition manual's guidelines for writing method sections (Moreno & Carrillo, 2019) and the STROBE checklist (Vandenbroucke et al., 2007) for writing quantitative method sections. The STROBE checklist was used because it entails additional points to consider in a quantitative method section, which are not part of the APA guidelines. A list of the STROBE criteria can be found in Appendix E.

### *Study Design*

The current study was executed using a cross-sectional design. The dependent variable is *doomscrolling*, which was measured using the Doomscrolling Scale. An additional, dependent variable is *climate-change doomscrolling* and it is measured with self-developed items. The independent variable is a mental health aspect, related to the corresponding research question of each researcher. Each aspect is measured with an individual questionnaire. For the current thesis, the independent variable is *helplessness*. The three other variables for the other research questions are *depression*, *anxiety*, and *social support*. Additionally, *sex* is an additional independent variable in the current thesis. Likert scales are used in the instruments to measure each variable, so, both the predictors and the dependent variables are numerical. Sex is a dichotomous, categorical variable.

### *Participants & Recruitment*

In the second study, a mix of convenience and snowball sampling was used to draw participants to the online survey. Again, the researchers uploaded an advertisement for participation on their social media accounts (see Appendix F). The advertisement was available from April 19<sup>th</sup> 2023 and was stopped on May 5<sup>th</sup> 2023. It entailed a link to the website Qualtrics, where the online survey took place. 16 participants accessed the survey via the SONA system of the University of Twente (UT), which is an online environment in which undergraduate psychology students can participate in studies in exchange for tokens, so-called SONA points. The chosen sampling method was beneficial for quickly recruiting a large number of participants. A major disadvantage was that mostly people from the direct environment of the researchers responded to the advertisement and the SONA system is used exclusively by Psychology students from the UT, which may lead to a less representative sample.

Exclusion criteria were (1) being < 18 years old, (2) having no/poor English skills since the survey was presented in English only, (3) currently receiving treatment or medication for a mental disorder, and (4) a suicide attempt within the last two years. The questionnaires were

presented only in English and in no other language because some of them were not confirmed in German/Dutch.

The sample consisted of 208 participants. 78 (37.5%) participants were deleted from the data set due to missing responses in one or more surveys, leaving the researchers with a remaining 130 participants (response rate = 62.5%). Of the remaining participants, 40 (30.77%) were male and 89 (68.46%) were female. Mean age was 27.68 (SD = 10.42) with an age range of 19 to 62. 81 (62.31%) of the candidates were from Germany, 17 (13.08%) from the Netherlands, and six (4.62%) from France. 59 (45.38%) of the participants indicated a high school diploma that qualifies for attending a university of applied sciences as their highest level of education. 33 (25.38%) stated that they held a high school diploma that qualified them for regular universities. See Table 3 for a summary of all demographics.

**Table 3**

*Demographic Characteristics of the Current Sample*

<b>Demographic</b>	<b>Mean (SD)</b>	<b>Frequency (%)</b>
<b>Age</b>	27.68 (10.42)	130 (100)
<b>Sex</b>		
Male	-	40 (30.77)
Female	-	89 (68.46)
Not specified	-	1 (.77)
<b>Nationality</b>		
Germany	-	81 (62.31)
Netherlands	-	17 (13.08)
France	-	6 (4.62)
Romania	-	3 (2.31)
Portugal	-	2 (1.54)
United Kingdom	-	2 (1.54)
United States	-	2 (1.54)
Indonesia	-	1 (.77)
Japan	-	1 (.77)
Malaysia	-	1 (.77)
Mexico	-	1 (.77)
Poland	-	1 (.77)
Switzerland	-	1 (.77)

Taiwan	-	1 (.77)
Vietnam	-	1 (.77)
<b>Highest Education</b>		
High school diploma (university of applied sciences)	-	59 (45.38)
High school diploma (regular university)	-	33 (25.38)
Bachelor's degree	-	21 (16.15)
Master's degree	-	4 (3.08)
PhD / doctorate	-	4 (3.08)
Less than high school diploma	-	1 (.77)
Other	-	8 (6.15)

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### **Materials**

Based on the analysis of the interviews from study 1, the researchers developed 11 questionnaire items related to climate-change doomscrolling. These items were used in an online survey, in addition to established, psychological questionnaires. The questionnaires were the Doomscrolling Scale (DSS), the Coping Competence Questionnaire (CCQ), Beck's Depression Inventory (BDI), the Perceived Social Support Questionnaire (F-SozU K-6) and the Hamilton Anxiety Scale (HAM-A). For the research question of this thesis, it is only necessary to describe the self-developed scale, the DSS, and the CCQ in detail.

**Climate Change Doomscrolling Scale.** The scale with the self-developed items was termed Climate Change Doomscrolling Scale (CCDS) by the researchers. It aims to measure climate change doomscrolling (CCD). The 11 items were answered on a 7-point Likert scale, ranging from "strongly agree" to "strongly disagree". Items 3, 4, and 10 were coded in reverse (see Appendix G). Cronbach's alpha coefficient for this self-developed instrument suggested acceptable reliability ( $\alpha = .75$ ).

**Doomscrolling Scale.** The DSS is an instrument that was developed by Sharma et al. in 2022. The scale entails 12 items, which are answered on a 7-point Likert scale, ranging from "strongly agree" to "strongly disagree." It tests the prevalence of doomscrolling behaviours in non-clinical samples. The scale was first tested by the developers in a broad population from different countries and continents. The developers tested the scale, and factor analysis confirmed a unidimensional structure. The reliability coefficient was excellent ( $\alpha = .935$ ). Subsequent testing in a Turkish sample (Satici et al., 2022) showed an acceptable validity, with

factor analysis confirming the unidimensional structure, and excellent reliability with a Cronbach's alpha coefficient range of  $\alpha = 0.938 - 0.944$  for all 15 items. Cronbach's alpha in the current study sample was  $\alpha = .92$ , which indicates excellent reliability.

**Coping Competence Questionnaire.** The CCQ is a 12-item questionnaire that was developed by Schroder & Ollis in 2013. It is answered on a 6-point Likert scale, ranging from "very characteristic of me" to "very uncharacteristic of me." It tests how well people can cope with learned helplessness in their everyday lives, thus revealing information about a person's resilience to depression and helplessness. It was first tested in a population of undergraduate students from Utah State University in the United States. Testing verified the validity, with factor analysis showing one underlying factor and excellent reliability was established with a Cronbach's alpha coefficient of  $\alpha = .927$ . Cronbach's alpha in the current study was  $\alpha = .94$ , also indicating excellent reliability.

### ***Procedure***

The participants accessed the online-survey platform Qualtrics via their device; either via the social media advertisements of the researchers or via the SONA system of the University of Twente. Because the link can be accessed from anywhere, nothing is known about the exact setting of the participants when they were filling out the questionnaire. At the beginning of the survey, they received information about the nature and purpose of the study and were asked to check boxes to give their consent for participating in the study (see Appendix H). Afterwards, the participants were asked to fill in their demographic data, such as age, sex, nationality, and highest level of education. Participants who accessed through the SONA system were asked to indicate their SONA ID. The self-developed items were presented at the very beginning of the survey. The questionnaires were then presented to the participants in randomised order to reduce bias due to order effects. The participants had to check boxes to give their answers to the corresponding items. After the survey, the participants were thanked for their participation.

### ***Data Analysis***

Data were analysed using the statistical software program R (version 4.3.0). Since one participant did not indicate their sex/gender identity, this person was excluded from all analyses because the research question explicitly focuses on sex differences. Furthermore, each hypothesis was split into two partial hypotheses. The step of splitting the hypotheses was necessary because the phenomenon CCD is the main focus of the current thesis and needs to be investigated separately from the phenomenon doomscrolling (DS). Furthermore, DS was measured with an established instrument (the DSS) and CCD was measured with the self-developed items (the CCDS). To not weaken the validity of the DSS by combining it with the

CCDS, two separate analyses were necessary per original hypothesis. The additional analyses test the additional hypotheses about CCD. The adjusted hypotheses were:

*H1-A: females engage in DS more than males*

*H1-B: females engage in CCD more than males*

*H2-A: DS is negatively associated with the ability to cope with helplessness*

*H2-B: CCD is negatively associated with the ability to cope with helplessness*

*H3-A: The negative effect of coping with helplessness on DS is stronger in males than in females*

*H3-B: The negative effect of coping with helplessness on CCD is stronger in males than in females.*

**Hypothesis 1.** To address hypothesis H1-A, a linear model with *sex* as the independent variable and *DS* as the dependent variable was developed. *Sex* was a dichotomous, categorical variable with *male* as the reference group. *DS* consisted of the mean scores from the DSS. *DS* was a continuous, numerical variable.

To address hypothesis H1-B, a linear model with *sex* as the independent variable and *CCD* as the dependent variable was developed. *CCD* consisted of the mean scores from the CCDS. *CCD* was a continuous, numerical variable.

**Hypothesis 2.** To address hypothesis H2-A, a linear regression model with *resilience to helplessness* as the independent variable and *DS* as the dependent variable, was developed. *Resilience to helplessness* was measured using the total scores of the CCQ. Since the CCQ items are formulated in reverse, the scores of the single items were reversed before establishing the total scores. *Resilience to helplessness* was a continuous, numerical variable. A significant effect of *resilience to helplessness* on *DS* would lead to acceptance of the hypothesis.

To address hypothesis H2-B, a linear regression model with *resilience to helplessness* as the independent variable and *CCD* as the dependent variable was developed. A significant effect of CCQ on CCD would lead to acceptance of the hypothesis.

**Hypothesis 3.** To address hypotheses H3-A and H3-B, *sex* was introduced as an interaction effect in both linear regression models of hypothesis 2. The main effects in these models were *CCQ score* and *sex*. The independent variables were *DS* in the first model and *CCD* in the second model. A significant interaction effect in each model would lead to the acceptance of each hypothesis.

## Results

### *Descriptive Statistics*

The mean score on the DSS was 2.19 (SD = .99) in the current sample, whereas the mean score for the CCDS was 4.39 (SD = .90). The mean score on the CCQ was 47.38 (SD = 12.41). The CCQ data appeared marginally positively skewed but close to 0 (skewness = .08), whereas the CCDS items were slightly skewed to the left (skewness = -.31). The DSS, however, appeared highly skewed, with a floor effect (skewness = 1.35). In Sharma et al.'s (2022) validation study for the DSS, skewness was also visible, thus, this effect seems to be normal. See Appendix I, J and K for visual representations of all three variable distributions.

### *Correlations*

Correlations between the three used variables indicated no noteworthy effects, as can be seen in Table 4. All occurring correlations were weak.

**Table 4**

*Correlations between all Relevant Variables*

	DSS	CCDS	CCQ
DSS	-	-	-
CCDS	.329	-	-
CCQ	-.309	-.156	-
Sex	.089	.233	-.161

### *Statistical Power*

Statistical power was tested using two power analyses performed with the statistical software G\*power (version 3.1.9.6). For the simple linear regression models, a one-tailed G\*power test with  $\alpha = .05$ , an effect size  $F^2 = .15$ , and a power coefficient  $1 - \beta = .80$  revealed a required sample size of  $n = 43$  ( $df = 41$ ) for a model with one predictor (see Appendix L). For the linear models with an interaction effect, a one-tailed G\*power test with  $\alpha = .05$ , an effect size  $F^2 = .15$ , and a power coefficient  $1 - \beta = .80$  revealed a required sample size of  $n = 43$  ( $df = 39$ ) for a model with three predictors (see Appendix M). Thus, the current sample size was large enough for the planned analyses.

### *Linear Assumptions Testing*

For linear assumptions testing, four linear models were developed. One in which the DSS was regressed on sex (model A), one in which the DSS was regressed on the CCQ (model B), one in which the CCDS was regressed on sex (model C), and one in which the CCDS was regressed on the CCQ (model D).



**Normality.** Normality of the residuals was established by generating histograms of the residuals for all four assumption models. Model A and model C included the DSS, thus, they were heavily skewed to the left ( $skewness_A = 1.34$ ,  $skewness_C = 1.33$ ). The assumption of normality was not met for these models (see Appendix N and P). The assumption of normality was met for model B ( $skewness_B = -.23$ ) and model D ( $skewness_D = -.27$ ), as can be seen in Appendix O and Q. The models involving the DSS scores violated the assumption of normality. As a solution for this, the logarithm of the DSS mean scores was used in hypothesis testing instead of the DSS mean scores.

**Linearity.** The residual versus fitted plots showed no abnormalities for all four models (see Appendix R, S, T and U). The assumption of linearity was met.

**Homoscedasticity.** The scale-location plot of all four models showed no abnormalities (see Appendix V, W, X and Y). The assumption of equal variances was met.

**Independence.** Four Durbin-Watson tests were performed to establish the assumption of independence. The tests showed no statistical significance for model A ( $p = .995$ ), for model B ( $p = .336$ ), for model C ( $p = .969$ ), and for model D ( $p = .566$ ). The assumption of independence was, thus, met.

### *Hypothesis 1*

**H1-A.** In the first linear regression model, women scored higher than men by .09 on the DSS. The result was insignificant ( $p = .26$ ). H1-A was rejected. Sex did not act as a significant predictor of DS (see Table 5).

**Table 5**

*Linear Regression Model with Sex as the Predictor and DSS score as the Dependent Variable*

Variable	<i>b</i>	<i>SE</i>	<i>p</i>	95%-CI	
				Lower	Upper
(Intercept)	.633	.067	< .001***	.501	.764
Sex	.091	.080	.260	-.068	.249

*Note:* *b* = estimate, *SE* = standard error

*Probability Note:* \* =  $p \leq .05$ , \*\* =  $p \leq .01$ , \*\*\* =  $p \leq .001$

**H1-B.** In the second linear regression model, a significant effect was observed. Men scored 4.08, whilst women scored 4.53 ( $SE = .167$ ,  $p = .008$ ). The 95% confidence interval showed a lower boundary of .12 and an upper boundary of .78. H1-B was accepted. Sex was a significant predictor of CCD, with women scoring higher than men (see Table 6).

**Table 6**

*Linear Regression Model with Sex as the Predictor and CCDS score as the Dependent Variable*

Variable	<i>b</i>	<i>SE</i>	<i>p</i>	95%-CI	
				Lower	Upper
(Intercept)	4.08	.139	< .001***	3.80	4.35
Sex	.45	.167	.008**	.12	.78

*Note:* *b* = estimate, *SE* = standard error

*Probability Note:* \* =  $p \leq .05$ , \*\* =  $p \leq .01$ , \*\*\* =  $p \leq .001$

### **Hypothesis 2**

**H2-A.** The third linear regression model revealed that resilience to helplessness had a small negative effect on DS ( $b = -.01$ ,  $SE = .003$ ,  $p < .001$ ). The 95% confidence interval revealed a lower boundary of  $-.017$  and an upper boundary of  $-.006$ . H2-A was accepted. In the corresponding model to this hypothesis, scores on the CCQ were a significant predictor of scores on the DSS, with higher CCQ scores corresponding to lower DSS scores (see Table 7).

**Table 7**

*Linear Regression Model with CCQ score as the Predictor and DSS score as the Dependent Variable*

Variable	<i>b</i>	<i>SE</i>	<i>p</i>	95%-CI	
				Lower	Upper
(Intercept)	1.25	.138	< .001***	.977	1.52
CCQ	-.012	.003	< .001***	-.017	-.006

*Note:* *b* = estimate, *SE* = standard error

*Probability Note:* \* =  $p \leq .05$ , \*\* =  $p \leq .01$ , \*\*\* =  $p \leq .001$

**H2-B.** The fourth linear regression model revealed that resilience to helplessness had no significant effect on CCD ( $p = .07$ ). H2-B was rejected. Scores on the CCQ did not predict scores on the self-developed CCDS (see Table 8).

**Table 8**

*Linear Regression Model with CCQ score as the Predictor and CCDS score as the Dependent Variable*

Variable	<i>b</i>	<i>SE</i>	<i>p</i>	95%-CI	
				Lower	Upper
(Intercept)	4.92	.311	< .001***	4.31	5.54
CCQ	.011	.006	-.077	-.024	.001

*Note: b = estimate, SE = standard error*

*Probability Note: \* =  $p \leq .05$ , \*\* =  $p \leq .01$ , \*\*\* =  $p \leq .001$*

### **Hypothesis 3**

**H3-A.** In the fifth linear model, the main effect of CCQ on DS was non-significant ( $p = .10$ ). Moreover, the main effect of sex on DS was non-significant ( $p = .432$ ). The interaction effect of CCQ and sex on DS was also non-significant ( $p = .50$ ). H3-A was rejected. When the interaction effect was introduced into this model, the effect seen in model 2-A became non-significant. The sex of the participant did not play a role in the significant effect of the CCQ score on the DSS score (see Table 9).

**Table 9**

*Linear Regression Model with CCQ score as the Predictor, Sex as the Moderator, and DSS score as the Dependent Variable*

Variable	<i>b</i>	<i>SE</i>	<i>p</i>	95%-CI	
				Lower	Upper
(Intercept)	1.06	.268	< .001***	.534	1.59
CCQ	-.009	.005	.1	-.019	.002
Sex	.248	.315	.432	-.375	.87
CCQ * Sex	-.004	.006	.5	-.017	.008

*Note: b = estimate, SE = standard error*

*Probability Note: \* =  $p \leq .05$ , \*\* =  $p \leq .01$ , \*\*\* =  $p \leq .001$*

**H3-B.** In the last linear model, no significant results were revealed. The main effect of CCQ scores on CCD was non-significant ( $p = .793$ ), as well as the main effect of sex on CCD ( $p = .235$ ). The interaction effect of CCQ scores and sex on CCD was also non-significant ( $p = .539$ ). H3-B was rejected. Again, a previously determined, significant effect became insignificant once the interaction effect was introduced (see Table 10).

**Table 10**

*Linear Regression Model with CCQ score as the Predictor, Sex as the Moderator, and CCDS score as the Dependent Variable*

Variable	<i>b</i>	<i>SE</i>	<i>p</i>	95%-CI	
				Lower	Upper
(Intercept)	4.23	.589	<.001***	3.06	5.39
CCQ	-.003	.011	.793	-.026	.020
Sex	.825	.692	.235	-.544	2.19
CCQ * Sex	-.008	.014	.539	-.036	.019

*Note: b = estimate, SE = standard error*

*Probability Note: \* =  $p \leq .05$ , \*\* =  $p \leq .01$ , \*\*\* =  $p \leq .001$*

**Table 11**

*Rejection/Acceptance of Each Hypothesis*

Hypothesis	Accepted / Rejected
H1-A	Rejected
H1-B	Accepted
H2-A	Accepted
H2-B	Rejected
H3-A	Rejected
H3-B	Rejected

### General Discussion

The current paper entailed an exploratory study which aimed to further inspect the topic of CCD, using a mixed methods approach. More precisely, the focus of the current thesis was sex differences in DS, CCD, and whether DS and CCD can be explained by individual levels of helplessness. The main findings from the qualitative study were that (a) feelings of helplessness arise in many of the participants when confronted with climate change, (b) helplessness can lead to avoidance of the news, and (c) a personal connection or strong emotion, such as empathy for catastrophe victims is often necessary to engage further with climate change news. The main findings from the quantitative study were that (a) sex has no connection to DS in general but a small connection to CCD, (b) helplessness is connected to DS but not to CCD, and (c) there is no interaction effect between sex and helplessness that accounts for either DS or CCD.

Since both studies within this paper are complementary and partially based on one another, the qualitative and the quantitative study will not be discussed as separate research approaches but evidence from both study parts will be integrated and compared when results are discussed in the following discussion section.

### **General Findings on Doomscrolling**

It can be seen that doomscrolling generally seems to be a less common phenomenon in the current sample, as the skewness rate of the DSS was even lower than in the validation study by Sharma et al. (2022), where the rate was already low enough to describe a floor effect. However, the self-developed instrument, the CCDS, showed no such anomaly. This might indicate that DS in the climate change context might be more frequent than in general, or in the Covid-19 context, in which the DSS was originally developed. Albeit occurring in the quantitative component, this effect was less visible in the interview sample, in which participants seldomly described personal news consumption behaviours that resembled DS. Several participants in the interviews reported that the motivations for further engaging with climate change news were broad and varied; personal closeness seemed to be one very important factor, together with the need to keep up-to-date with what is happening in the world. These factors were described as an exception in news consumption and, thus, DS was also not reported. Only participant 17 described her behaviours in this regard as excessive, which seems to be in line with the normal distribution of the CCDS; participant 17 might be an outlier in this regard. Generally, a unique distinction was visible between the behaviours described by the current, qualitative sample and previous qualitative samples in the DS context; several previous DS studies have discovered that perceived threat of the topic led the participants to engage *more* with the news and keep up-to-date (Groot Kormelink & Klein Gunnewiek, 2021). In the current interview sample, the threat of climate change seemingly works in the opposite direction as people were more hesitant to engage with the topic when they felt threatened or overwhelmed by media reports on it. This finding is in line with Mannell and Meese (2022) who found that people purposefully distanced themselves from reading bad news to protect their mental state. In the current interviews, several participants expressed that a negative influence on their mood was a motivation to refrain from consuming climate change news. Indeed, exposure to climate change reports in the media has in the past been shown to have a positive relationship with climate anxiety (Ogunbode et al., 2022).

In previous research regarding DS during the Covid-19 pandemic, some people showed heightened interest in Covid-19 news, which led to further information seeking, which then led to rumination about the topic, even more information seeking and, ultimately, doomscrolling

(Groot Kormelink & Klein Gunnewiek, 2021). This dynamic was not described by the current interview sample in the climate change context. Interestingly, both topics (climate change and Covid-19) seem to have similar effects if the person notices that the news impacts their well-being too much. Then, they might refrain from further consuming such news, as was also described in the themes *Paralysis*, *Detachment*, and *Threat*.

A possible reason for the difference regarding previous qualitative DS research and the current qualitative findings regarding CCDS, could be that Covid-19 was an acute and drastic disruption in everyday life, whilst climate change is a slow process and the perceived threat is, thus, not experienced as dramatically as the first Covid-19 lockdown (Groot Kormelink and Klein Gunnewiek, 2021). Evidence for this also stems from the theme *Privilege* and *Personal Involvement*, as many participants described that they were not too concerned about climate change because they or their loved ones were not affected personally. Many of them believed they would be more concerned with climate change topics if they themselves had experienced a catastrophe and were, thus, personally affected. A large international study did not find evidence for these prophecies made by the interview participants. In said study, experiencing flooding due to climate change did not affect levels of climate anxiety, no matter how often flooding was experienced (Ogunbode et al., 2022). It is, thus, possible that this assessment of their own levels of anxiety is unrealistic and even if climate change effects would increase in their living areas, their anxiety and, thus, their doomscrolling symptoms might not increase.

Thus, the qualitative results of the current study seem to indicate that DS is *less* frequent in the climate change context, compared to previous DS studies in different contexts (Price et al., 2022). However, this contrasts the aforementioned effect observed in the quantitative component; the heavily negatively skewed distribution of the DSS, compared with the normal distribution of the CCDS (see Appendix I and J). The findings of the two research components seem contradicting and only uncertain answers can be drawn from either component. One possible explanation for this contradiction might be that the qualitative sample is less reliable than the quantitative sample due to lower sample size and overall, less diversity among the participants. Thus, the interview sample seems less representative of the population than the quantitative sample. The results of the second, quantitative study can be regarded as more reliable in this regard. According to the more reliable and generalizable results from the quantitative component, CCD appears *more* often than DS in other contexts.

### **Sex Differences in Doomscrolling**

In line with previous research (Sharma et al., 2022; Satici et al., 2022), no sex differences were found with regard to DS. However, there was a small but significant difference

when comparing the CCDS scores of the two sexes, with women scoring higher on the self-developed instrument than men. One possible explanation for this phenomenon is that, according to a 2010 study, women tend to be better informed about climate change than men (McCright as cited in Crane et al., 2022). This trend was, however, not visible in the interview sample as both male and female candidates expressed moderately high levels of knowledge about climate change and its effects. Interestingly, the men in the interview sample seemed to be better informed about recent climate *politics* but this tendency was possibly occurring because the older candidates were majorly men and older people seem to be more engaged with politics than their younger counterparts (Grasso, 2018).

A second possible explanation for this effect could be that women's higher vulnerability for developing mental health issues in the climate change context (Boluda-Verdú et al., 2022; Neria & Shultz, 2012; Palinkas & Wong, 2020), leads them to deal more intensely with the topic. In the context of the current thesis, this was examined in hypothesis H3-B, where helplessness as a mental health aspect was tested for its interaction with the sex of the participant. Since no significant effects were found for this model, this explanation can be ruled out. Albeit women tend to cope more emotionally than men (Matud, 2004), feelings of helplessness do not seem to be an explanatory factor when considering sex differences in CCD. It is, however, possible that different coping mechanisms could account for the discovered differences in males and females.

One explanation could be that women tend to be more empathetic than men (Christov-Moore & Iacoboni, 2018) and from the interview sample, it appeared that concern for fellow human beings and feeling personally connected to a climate incident were important motivations to engage in doomscrolling. Women might have more empathy towards people suffering from climate change consequences (Arnocky & Stoink, 2010; Sinha, 2019) and through this felt personal connection, they might deal with the issue more often and more intensely when reading the news.

As another possible reason for this observed sex difference, we must consider the fact that biological women bear children and, thus, contribute to bringing the next generations into the world, who will most likely suffer more from climate impacts than the current generation. Unfortunately, women are still the main caregivers to children (Lott et al., 2022 as cited in Deutsche Welle, 2022) in this day and age and, thus, bear the responsibility of raising the next generation. Additionally, there exist more single mothers than single fathers (Duffin, 2022), which makes these women not the primary but the only caregivers for their children. Their concern for the health and well-being of the next generation might be higher than men's concern

simply because they feel more responsible for their upbringing. As aforementioned, in the interview participants, it was visible that concern for others, including concern for future generations, was a motivation for increased doomscrolling. Women might want to keep more up-to-date with climate developments due to reproductive reasons. Additionally, the question of having children in the first place might be connected to the level of climate change news that is consumed and how concerning such news is considered. Small evidence for this stems from one of the younger, female interview participants who stated that she does not want to have children because of the threat that climate change poses to the next generations.

### **Helplessness in Doomscrolling**

In the quantitative study, it was found that a person's level of resilience to helplessness was related to reduced scores in the DSS. Since the DSS was developed in the Covid-19 context, this result can be interpreted as higher feelings of helplessness being related to more DS, especially with regard to Covid-19 news. Consequently, this means that lower levels of helplessness – or a higher resilience to it – are more likely to occur in people who are less expected to doomscroll. Therefore, it is possible that resilience to helplessness might be a possible protective factor against DS behaviour.

Opposing the observed effect of resilience to helplessness on DS, resilience to helplessness did not have an effect on CCD. This was confirmed by the rejection of hypothesis H2-B. Connecting this to the qualitative analysis, this result seems to be surprising since the interview candidates reported that refraining from climate change news was one way to cope with negative feelings – such as helplessness – that the news evoked. If this was a general phenomenon, it would show up in the quantitative analysis as a *positive* effect of CCQ scores on CCDS scores, but this does not seem to be the case here.

However, some interview participants also reported the opposite was happening to them; rumination about climate change caused further engagement with the topic instead of refraining from reading the news. If this was a general phenomenon in the population, CCQ scores would have a *negative* effect on CCDS scores.

Generally, the interview study showed that the motivations for engaging with climate change news are varied, complex, and often very personal. Some participants withdrew from reading the news when it made them feel helpless, whilst others were attaining more to the news to confirm their negative thoughts. This is in line with previous DS research (Groot Kormelink & Klein Gunnewiek, 2021). One person engaged in excessive news consumption even though she simultaneously reported high feelings of threat, anger, and helplessness connected to climate change. These emotions are common in people who are very aware of



climate change (Boluda-Verdú et al., 2022). Nevertheless, engaging in *more* CCD due to *heightened helplessness* seems to be an exception as it does not show up as a significant effect in the quantitative results. Moreover, in the interview study, seemingly opposing motivations for reading more news, were described by the same participants. This was depending on the individual context and also the content of the news. For example, one candidate reported that rumination about climate topics could lead to researching more about the topic but in other situations, it could lead to news avoidance. The motivations for CCD may be too differentiated and varied to detect an overall tendency of whether helplessness is related to more or less CCD. Relatedly, previous research has shown that environmental concerns can lead to pro-environmental behaviours but it can simultaneously decrease such behaviours (Innocenti et al., 2023). If that is also the case in the current study, helplessness may lead to an increase in CCD in one person and a decrease in CCD in another person. These effects would then simply outweigh each other in a large sample and, thus, not show up in statistical analyses.

Although there was no statistically significant connection between resilience to helplessness and CCD, it is important to mention that other coping mechanisms than CCD for helping to deal with helplessness were mentioned by the interview participants. Seven of them reported that one form of coping was contributing to a more sustainable and ecologically-friendly lifestyle. In line with this, previous research (Ogunbode et al., 2022) has shown that levels of eco-anxiety are positively linked to environmentally conscious behaviour. The more concerned a person is about the environment, the more likely they may be to take action against climate change. The current study seems to confirm this.

### **Limitations**

Since this research project was a pilot study and, as a Bachelor thesis, additionally timely constrained, certain limitations inevitably apply to the findings of this study.

First and foremost, all conclusions drawn about the CCDS and its relationship with other variables should be viewed very carefully. The CCDS was developed using evidence from the qualitative study and might, thus, be a more suitable instrument to measure CCD than the DSS. However, no validation study was conducted with this new instrument and, therefore, the researchers are unable to determine whether the CCDS measured the behaviour it was intended for; namely, CCD. Moreover, the instrument was only tested for reliability using one reliability coefficient and, albeit an acceptable Cronbach's alpha coefficient, this was only tested in the current sample and not in a specifically designated sample for a validity and reliability analysis.

As the CCDS is based on the coding and thematic analysis of the interview transcripts, it also needs to be stated that the chosen theoretical framework for the qualitative study –

thematic analysis – is very flexible and the codes that each researcher used in his or her analysis might be very different from the fellow researchers' codes. Since the coding was conducted individually and without predetermined codes, inter-rater reliability was not calculated, which could suggest less reliable results in the qualitative part. It could possibly also suggest that the CCDS is a less reliable instrument than it could have been if predetermined codes were used from the beginning to develop the CCDS items.

Methodological limitations also need to be mentioned with regard to the DSS. In this study, the instrument was treated as a general measure of DS without further contextual clues. This could be an issue with regard to validity since the DSS was developed in the context of Covid-19 DS and was not originally intended to measure DS independently of this context.

Additionally, there are some limitations to the current samples. The interview sample for the qualitative study was drawn from the close proximity of the researchers and despite the researchers not interacting with well-known persons, potential bias is possible since the participants knew that each researcher would be able to read all of the transcripts and the researchers whom they know privately would be able to identify their statements. Furthermore, the demographics were very similar. All participants were white and had a similar SES, being part of the upper-middle class in two central European countries. This is especially important, since individuals of lower SES suffer more from the consequences of climate change (Bharadwaj et al., 2022), albeit contributing substantially less emissions than higher SES individuals (Enzler & Diekmann, 2019). Conclusively, the interview sample is not representative of the population in Germany and the Netherlands. This could explain the difference between the current findings and Ogunbode et al.'s (2022) finding that there is no relationship between climate anxiety and experiencing flooding. Contrastingly, the interview participants in the current study claim that personal involvement would indeed heighten their climate concerns. The current sample is certainly not comparable to the sample in the large study by Ogunbode and others (2022). The interview sample is too small and too specific to draw generalizations from it.

Similar problems occur with regard to the online survey sample, as a large majority of this sample stems from Germany and other nationalities are underrepresented. Central- and South-American nationalities as well as African countries were not represented at all. Also, women were clearly overrepresented in the quantitative sample. This sample additionally held the limitation that most of the participants were highly educated and, thus, might have better access to news portals and trustworthy sources. Also, the dropout rate for the survey sample was extremely high, which might possibly be caused by the length of the survey. Previous

research suggests that the length of an online survey has an effect on the dropout rate (Hoerger, 2010) and the quantitative study was lengthy. Furthermore, online surveys generally hold the disadvantage that the conditions for each participant cannot be controlled for, when they take the survey. As a last point regarding the samples, both of the samples were relatively small ( $n = 15$ ;  $n = 130$ ). Generalizations drawn from the current findings should, therefore, only be made with great care.

Certain limitations apply to the researchers themselves, who had only scarce experience with conducting interviews than with quantitative research. Through body language, intonation, or accidental leading questions, the researchers may have unknowingly biased their qualitative sample. Unfortunately, due to time constraints, no pilot test was conducted with the interview questions. Pilot testing might have been helpful to counteract the effects of the interviewers' low experience.

As for all correlational studies, it needs to be stated here, that correlation cannot determine causation and the relationships in the quantitative study do not determine cause and effect. The developed models simply illustrate a potential relationship between two or more variables without judging which variable causes the other.

As a last point, both sections of the current thesis were based solely on the self-report of the participants. Self-report measures are prone to be the source of certain biases such as social admirability and underreporting of less socially acceptable behaviour. A 2020 study by Vesely and Klöckner found that social desirability is associated with positive biases in self-reporting pro-environmental behaviour. This is especially relevant with regard to the current interview participants who were eager to report their own climate-conscious actions. There is no effective method implied in the current study to confirm that the interview participants and the survey participants reported objectively and unbiasedly in the corresponding sections of this study. This, together with the fact that only little theoretical background exists for the issue of CCD, means that all findings in the current thesis should be treated with care.

### **Strengths**

Albeit this thesis having several limitations, there are also some strong points of the research project, which are just as noteworthy.

First and foremost, the use of a mixed methods approach yields the strong advantage of gathering diverse data and gaining a clearer overview about the previously understudied topic of CCD. Hereby, the approach of combining qualitative and quantitative research was especially important to ground the statistical analysis of the issue on previously gathered data. Since no CCD data was available at the point this thesis was written, the interview component

gave great insights into the dynamics underlying media consumption in the context of climate change. Without the qualitative component, it would not have been possible to strategically develop the CCDS and gather data from a larger sample. The qualitative and quantitative component were complimentary, as the disadvantages of qualitative research – such as small sample size and low generalizability – were counteracted by the benefits of qualitative research, such as higher reliability and reliability. Moreover, quantitative research is naturally lacking in details since it uses statistical models that only describes reality well, depending on how well the model fits the data. This disadvantage is counteracted by the insightful details of the interview participants.

In the previous section, ethnicity and SES of the interview sample was regarded as a limitation, but beyond that, the interview sample was diverse with regards to age and sex. There was a relatively large age range and the number of males and females within the sample was almost equal. This can be regarded as a strength of the current study because it leads to more nuanced data.

With regards to the quantitative sample, one major advantage was that the sample size was large with regards to the planned analyses. This was shown using a G\* power analysis (see Appendix L and M). The used sample size was more than double what the G\*power analysis had previously suggested as a sufficient sample size.

Furthermore, the development of the interview questions and the CCDS together with the other researchers was advantageous. Having more than one person to develop the questions/items, lead to a more nuanced views on how to translate the data and the previous literature into concrete questions/items.

However, the major strength of the current study was the development of the CCDS as a new instrument to measure CCD. Since CCD was previously not discussed in any type of research, it is a major strength to have such an instrument developed. The CCDS – albeit being developed solely on the data of the qualitative analysis – showed acceptable reliability and a normal distribution, which are promising attributes and show that this instrument may help future researchers when they further investigate the increasingly important topic of CCD.

### **Future Directions**

The current study was an exploratory pilot study. Therefore, large capacities exist for developing future research based on the current findings and methods applied for both the qualitative and the quantitative section.

Most importantly, a full validity and reliability study should be performed on the CCDS with a large, international sample to confirm its internal structure and reliability in

different contexts. Due to time constraints, this analysis was not possible for the current thesis but a full validation study can add valuable evidence to the findings of the current thesis.

Moreover, the development of a theoretical framework from the qualitative results would help future researchers to examine the phenomenon of CCD in more detail. If a framework and codes were to be pre-determined, future analyses of qualitative data in this context could be tested for inter-rater reliability, which would add more scientific value to the results.

Due to the qualitative sample including no participants from a lower SES background, it might be of scientific value to conduct the interviews with a sample from this demographic background. Lower SES individuals might offer a different perspective on the climate change topic since they are less privileged than the current sample. As Satici et al. (2022) revealed in their DSS validation study, lower SES is associated with higher scores on the DSS. On the other hand, research shows evidence that low SES citizens may worry less about climate change than higher-earning counterparts (Verachtert, 2022), which seems paradox since people in this demographic are also more prone to suffer from the consequences of climate change (Bharadwaj et al., 2022). They might also feel more resentment towards the system because they cause fewer emissions than higher-earning individuals (Enzler & Diekmann, 2019) but still have to suffer more of the consequences. It could be examined whether these unfair circumstances lead lower SES individuals to detach even more from the news than was the case in the current interview sample. A qualitative replication study with a different sample would be helpful to gain insights into these dynamics.

As aforementioned, it was not possible to determine precisely whether CCD is more or less frequent than DS. From the interview study, it seems less frequent whilst the distributions of both questionnaires show that it might be more frequent. Due to these contradicting findings, additional research will be needed to determine whether CCD is more or less frequent than DS with regard to Covid-19. An increased sample size is recommended for such follow-up studies since the current statistical sample was relatively small and there is a lot more scientific coverage with much larger samples on DS in the Covid-19 context (Satici et al., 2022; Sharma et al., 2022; Price et al., 2022) than on CCD.

Moreover, a potential follow-up study might test different moderators for the sex differences between men and women in the CCDS scores. As aforementioned, potential moderators could be reproductive choices, heightened concern for fellow human beings, or individual levels of empathy. The potential evidence from such studies would not only add

scientific value but could also be applied outside of science in, for example, treatment methods specifically designed for females who suffer from eco-anxiety.

As a last point, it is important to disentangle the relationship between mental health impacts, such as eco-anxiety and eco-grief, and DS. As the qualitative sample showed, feelings of grief, anger, sadness, frustration, and general uneasiness seem to be closely tied to reading news about climate change but can also possibly lead to news avoidance. In a longer-term study or an experimental study, for example, it could be determined whether eco-anxiety or eco-grief, for example, causes more DS or whether DS causes more eco-anxiety. This research could then be used to develop strategies and interventions to effectively protect citizens from the potential negative impacts of DS.

### **Conclusion**

Albeit this research project was methodologically limited by time constraints and lack of previous research, it held some important implications, such as the sex differences in CCD and individual news consumption behaviours in addition to personal influences that can lead to CCD. Being female was a positive predictor for CCDS scores. Women seem to be more susceptible to CCD. Resilience to helplessness was a negative predictor for DSS scores. People who are less able to cope with helplessness may be more likely to engage in DS but not in CCD. The qualitative study gave insights into the dynamics underlying climate change news consumption and revealed that a personal connection, compassion, and feelings of responsibility are important factors to explain CCD behaviour. These findings were especially helpful for developing the CCDS as a new self-report instrument for measuring CCD. The development of the CCDS should be prioritised in future research, as it currently seems to be a valuable instrument for gathering more evidence in the field of CCD. Furthermore, the current study can and should be used as a basis to develop more extensive studies in the future, using larger samples with different demographics.

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## Appendices

### Appendix A

#### *COREQ Checklist for Qualitative Method Sections and Corresponding Pages*

Criterion	Description	Page
Interviewer/facilitator	Which author/s conducted the interview or focus group?	12
Credentials	What were the researcher's credentials?	12
Occupation	What was their occupation at the time of the study?	12
Gender	Was the researcher male or female?	12
Experience and training	What experience or training did the researcher have?	12
Relationship established	Was a relationship established prior to study commencement?	12
Participant knowledge of the interviewer	What did the participants know about the researcher?	12
Interviewer characteristics	What characteristics were reported about the interviewer/facilitator?	12
Methodological orientation and theory	What methodological orientation was stated to underpin the study?	12
Sampling	How were participants selected?	12
Method of approach	How were participants approached?	12
Sample size	How many participants were in the study?	13
Non-participation	How many people refused to participate or dropped out? Reasons?	13
Setting of data collection	Where was the data collected?	13
Presence of non-participants	Was anyone else present besides the participants and researchers?	13
Description of sample	What are the important characteristics of the sample?	13

Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	13
Repeat interviews	Were repeat interviews carried out? If yes, how many?	N/A
Audio/visual recording	Did the research use audio or visual recording to collect the data?	13
Field notes	Were field notes made during and/or after the interview or focus group?	13
Duration	What was the duration of the interviews or focus group?	13
Data saturation	Was data saturation discussed?	N/A
Transcripts returned	Were transcripts returned to participants for comment and/or correction?	13
Number of data coders	How many data coders coded the data?	14
Description of the coding tree	Did authors provide a description of the coding tree?	15
Derivation of themes	Were themes identified in advance or derived from the data?	14
Software	What software, if applicable, was used to manage the data?	14
Participant checking	Did participants provide feedback on the findings?	14
Quotations presented	Were participant quotations presented to illustrate the themes / findings? Was each quotation identified?	14
Data and findings consistent	Was there consistency between the data presented and the findings?	14
Clarity of major themes	Were major themes clearly presented in the findings?	14
Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	14

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## Appendix B

### German Advertisement for the Interview Study – Social Media Post and Story Post

**WIRD DIE MENTALE GESUNDHEIT DURCH  
NACHRICHTEN ÜBER DEN KLIMAWANDEL  
BEEINTRÄCHTIGT?**

Wir führen eine Studie zum Thema „Medienkonsum im Bezug auf den Klimawandel und Auswirkungen auf die mentale Gesundheit“ durch und suchen nach Teilnehmern für ein **anonymes online Interview**.

Das Interview dauert voraussichtlich **30 bis 40 Minuten**. Alle Daten die zu Identifizierung führen können, werden **anonymisiert**. Die Identität der Teilnehmer wird geschützt.


Bei Interesse, bitte die unten stehende E-Mail Adresse kontaktieren!

Voraussetzungen für Teilnehmer

- ▶ 18+
- ▶ Deutsch oder Niederländisch
- ▶ Zurzeit nicht in Behandlung wegen einer mentalen Erkrankung

FRAGEN BEZÜGLICH DER  
TEILNAHME?

Bitte kontaktiere  
[l.grossekemper@student.utwente.nl](mailto:l.grossekemper@student.utwente.nl)



**NEGATIVE NACHRICHTEN  
UND KLIMAWANDEL**


Möchten Sie dazu beitragen, dass Forscher verstehen, wie sich negative Nachrichten über den Klimawandel auf die psychische Gesundheit auswirken?

Möchten Sie Ihre Erfahrungen zum Konsum von Nachrichten über den Klimawandel teilen?

Dann nehmen Sie bitte an einem anonymisierten Online-Interview teil!  
Für weitere Informationen kontaktieren Sie bitte:  
[n.f.a.apprich@utwente.student.nl](mailto:n.f.a.apprich@utwente.student.nl)

**Anforderungen:**

- Mindestalter 18 Jahre
- fließende Deutsch- oder Niederländischkenntnisse
- keine laufende Behandlung einer psychischen Erkrankung.





## Appendix C

### *Informed Consent Form for the Interview Study – German Template*

#### Einwilligungserklärung:

#### Doomscrolling in Bezug auf den Klimawandel und Auswirkungen auf die psychische Gesundheit

#### **Hintergrund**

Die Studie, an der Sie teilnehmen, untersucht das relativ neue Phänomen *Doomscrolling* oder *Doomsurfing*. Diese Begriffe beschreiben Verhaltensmuster, bei denen Personen dauerhaft negative Nachrichten zu einem bestimmten Thema auf Social Media oder in anderen (Online) Nachrichtenportalen nachverfolgen. Der zu untersuchende Hauptaspekt dieser Studie ist Doomscrolling in Bezug auf negative Klimawandel-Nachrichten. Das Forschungsteam wird auch die Auswirkungen von Doomscrolling auf die mentale Gesundheit untersuchen.

Das Ziel dieser Studie ist es, klarere Einblicke in das Phänomen Doomscrolling in Bezug auf den Klimawandel zu gewinnen. Da diese Studie Teil einer Bachelorarbeit ist, erhalten Sie den Link zur Arbeit, sobald sie veröffentlicht wird, und werden über die Ergebnisse informiert.

#### **Ablauf der Studie**

In folgendem Interview wird Sie ein Bachelor-Student oder eine Studentin im Fach Psychologie zu Ihrem Nachrichtenkonsumverhalten, Ihren Gedanken zum Klimawandel, und Aspekte ihrer mentalen Gesundheit befragen. Das Interview dauert etwa 30 bis 45 Minuten. Das Interview wird in Audioform aufgezeichnet. Die Aufnahmen werden sicher im Cloud-Service der Universität Twente gespeichert. Die Audioaufnahmen werden in schriftliche Texte transkribiert. Alle Daten, die zu einer Identifizierung Ihrerseits führen könnten, werden anonymisiert. Die Aufnahmen können nicht auf Sie zurückgeführt werden. Die Audioaufnahmen werden spätestens 6 Monate nach der Aufnahme gelöscht. Die Transkripte werden nach 2 Jahren gelöscht. Bitte beachten Sie, dass diese Bachelorarbeit nach ihrer Fertigstellung möglicherweise in einem wissenschaftlichen Journal veröffentlicht wird.

Wenn Sie sich bei der Beantwortung einiger Fragen unwohl fühlen sollten, sind Sie nicht verpflichtet diese zu beantworten. Wenn Sie aus der Studie aussteigen möchten, können Sie dies jederzeit äußern und das Interview wird abgebrochen. Sie müssen keinen Grund für Ihren Ausstieg angeben.

Wenn Sie weitere Fragen haben, wenden Sie sich bitte an einen der Studierenden:

Frederic Apprich ([n.f.a.apprich@student.utwente.nl](mailto:n.f.a.apprich@student.utwente.nl)),  
Luzie Grossekemper ([l.grossekemper@student.utwente.nl](mailto:l.grossekemper@student.utwente.nl)),  
Moritz Hau ([m.hau@student.utwente.nl](mailto:m.hau@student.utwente.nl)),  
Lisanne te Pas ([l.tepas@student.utwente.nl](mailto:l.tepas@student.utwente.nl)).

oder einen ihrer Supervisor:

Dr. Alejandro Dominguez Rodriguez ([a.dominguezrodriguez@utwente.nl](mailto:a.dominguezrodriguez@utwente.nl)),  
Dr. Shenja van der Graaf ([shenja.vandergraaf@utwente.nl](mailto:shenja.vandergraaf@utwente.nl)),  
Dr. Alex van der Zeeuw ([a.vanderzeeuw@utwente.nl](mailto:a.vanderzeeuw@utwente.nl)),  
Dr. Mercedes Almela Zamorano ([almela@tilburguniversity.edu](mailto:almela@tilburguniversity.edu)).

**Zutreffendes bitte Ankreuzen****Ja**   **Nein****Teilnahme**

Ich habe die Studieninformationen gelesen und verstanden oder sie wurden mir vorgelesen. Ich konnte Fragen zur Studie stellen und meine Fragen wurden zufriedenstellend beantwortet

Ich stimme freiwillig zu, an dieser Studie teilzunehmen und verstehe, dass ich Fragen ablehnen und jederzeit aus der Studie aussteigen kann ohne einen Grund zu nennen.

Ich verstehe, dass die Teilnahme an der Studie ein Interview und eine Audioaufnahme dessen beinhaltet, die wortwörtlich transkribiert wird, und dass die Aufnahmen nach Abschluss der Studie vernichtet werden.

   **Risiken bei Teilnahme an der Studie**

Ich verstehe, dass die Teilnahme an der Studie die folgenden Risiken mit sich bringt: psychisches Unbehagen durch das Besprechen von sensiblen Themen wie z.B. Klimawandel.

Ich befinde mich zurzeit nicht in psychotherapeutischer oder medikamentöser Behandlung wegen einer mentalen Erkrankung.

- Ich befinde mich in Behandlung
- Ich befinde mich NICHT in Behandlung

Ich hatte keinen Suizidversuch in den letzten 2 Jahren.

- Ich hatte einen Suizidversuch
- Ich hatte KEINEN Suizidversuch

Ich leide zurzeit nicht unter suizidalen Gedanken oder Vorstellungen.

- Ich leide darunter
- Ich leide NICHT darunter

**Informationsverarbeitung**

Ich verstehe, dass die von mir bereitgestellten Informationen für Forschungsberichte verwendet werden, die das Ziel haben, den Einfluss von Doomscrolling auf die psychische Gesundheit zu untersuchen und das Thema Klimawandel in den Medien beinhaltet.

Ich verstehe, dass persönliche Informationen, die über mich gesammelt werden und mich identifizieren können, wie z.B. mein Name oder mein Wohnort, nicht über das Forschungsteam hinaus geteilt werden.

Ich bin damit einverstanden, dass meine Informationen anonym in Forschungsergebnissen zitiert werden könnten.

   **Einwilligung Audioaufnahmen**

*Ich stimme zu, dass meine Aussagen aufgezeichnet werden dürfen.*

**Zukünftige (Wieder-)Verwendung der Daten** 

Ich erlaube, dass die Antworten, die ich gebe, in anonymisierten Transkripten und Audioaufnahmen archiviert werden dürfen, so dass sie für zukünftige Forschung und Lehre verwendet werden können.

**Unterschriften**

\_\_\_\_\_  
Name des/der Teilnehmenden                      Unterschrift                      Datum

\_\_\_\_\_  
Name des/der Forschenden                      Unterschrift                      Datum

**Kontaktinformationen für Fragen zu Ihren Rechten als Forschungsteilnehmer:**

Wenn Sie Fragen zu Ihren Rechten als Forschungsteilnehmer haben oder Informationen erhalten möchten, Fragen stellen oder Bedenken bezüglich dieser Studie mit jemand anderem als den Forschenden besprechen möchten, wenden Sie sich bitte an den Sekretär des *Ethics Committee* im Bereich *Humanities & Social Sciences* der Fakultät *Behavioural, Management and Social Sciences* der Universität Twente unter [ethicscommittee-hss@utwente.nl](mailto:ethicscommittee-hss@utwente.nl).

**Appendix D***Interview Questions and Possible Follow-Up Questions*

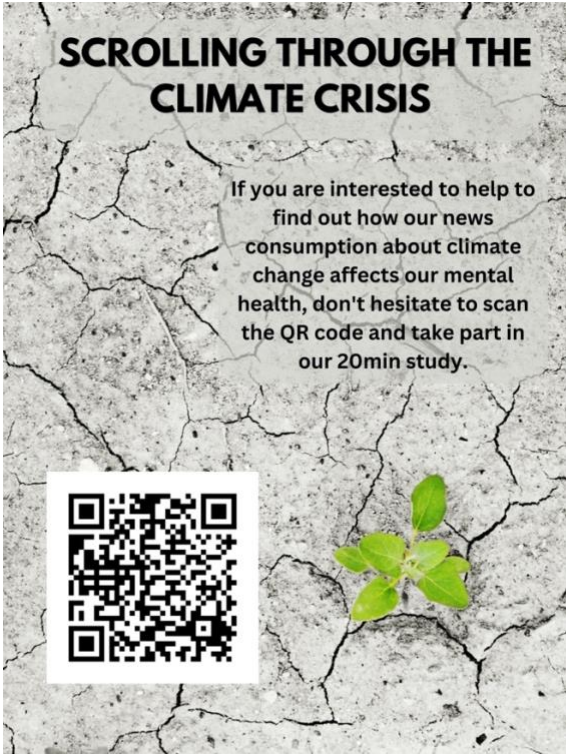
1. What patterns of news checking have you noticed in yourself when reading something negative about climate change?
  - a) Follow-up question: Do you think that this behaviour of reading climate change news is excessive and compulsive? Can you elaborate?
2. How – in your opinion – is climate change displayed in the news media if there is a current climate event, (such as the flooding in Germany)?
  - a) Follow-up question: What feelings are evoked when you read climate change news online in news media or social media?
  - b) Follow-up question: Do you find yourself reading climate-related news more often if there is a catastrophe? Can you elaborate?
3. When you think about the way you are feeling when you see negative news regarding climate change, what words come to your mind?
4. If such feelings occur; what do you do to counteract feelings of helplessness when reading news about climate change?
5. In what way do climate change news make you feel discouraged or encouraged to take action against it?
  - a) Follow-up question: Do you believe, people feel motivated to take action against climate change when reading about it in the news?
6. Can you describe what effect climate change has on your mental state of well-being?
7. When reading news about climate change, do you turn to others to discuss what you read, or for emotional comfort and understanding?
8. Do you share your attitude towards climate change and the news about it with friends, family, and colleagues?
  - a) Follow-up question: Do you see differences between generations?
9. Does news consumption about climate change increase negative thoughts about the future (with regards to the environment)?
  - a) Follow-up question: Can you describe what negative thoughts about the future arise when you watch/ read about news on climate change?
10. Do you feel anxious (and stressed/ afraid) when thinking about climate change and its negative ramifications for humanity (and the environment)?
  - a) Follow-up question: Can you describe your feelings further and explain what causes them in particular?

**Appendix E***STROBE Checklist for Quantitative Method Sections and Corresponding Pages*

<b>Criterion</b>	<b>Description</b>	<b>Page</b>
Study design	Present key elements of study design.	28
Setting	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection.	28
Participants	Give the eligibility criteria, and the sources and methods of selection of participants.	28
Variables	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable.	28
Data sources/measurement	For each variable of interest, give sources of data and details of methods of assessment. Describe comparability of assessment methods if there is more than one group.	30
Bias	Describe any efforts to address potential sources of bias.	31
Study size	Explain how the study size was arrived at.	28
Quantitative variables	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why.	32
Statistical methods	a) Describe all statistical methods, including those used to control for confounding.	32
	(b) Describe any methods used to examine subgroups and interactions.	32
	(c) Explain how missing data were addressed.	28
	(d) If applicable, describe analytical methods taking account of sampling strategy.	N/A
	(e) Describe any sensitivity analyses.	N/A

**Appendix F**

*English Advertisement for the Qualtrics Survey – Social Media Story*



**Appendix G***Self-Developed Items of the Climate Change Doomscrolling Scale (CCDS) and Corresponding Themes*

<b>Item</b>	<b>Theme</b>
1. I am actively searching for news when a climate-change related catastrophe occurs in my proximity.	Incidental versus actively searched news
2. I feel the need to avoid climate change news because I feel overwhelmed when reading them.	Detachment
3. R: The climate change topic is too pervasive; therefore, I pay less attention to it.	Desensitization
4. R: Uncertainty in the media about the impact of climate change in the future makes me refrain from engaging with the topic.	Paralysis
5. My concern for other people makes me check news more frequently when a climate-catastrophe is presented in the media.	Concern for others
6. If a climate-catastrophe would occur near me or near people who are close to me, I would feel the urge to look up more news about the event.	Personal involvement
7. Negative news about climate change makes me want to assess the truthfulness of the information. Therefore, I actively search for more information.	Scepticism towards media Optimism/Pessimism
8. I feel it's my duty to keep up to date with climate change news and be knowledgeable about the topic.	Individual responsibility
9. My concern about the threat climate change poses to the environment makes me consume news more frequently about the topic.	Threat
10. R: Given my location on the planet, I am less urged to consume news about the changing climate and its consequences.	Privilege
11. Consuming news about the environment urges me to stay informed and up to date with the topic of climate change.	Need to stay informed

*Note:* R = Items need to be coded in reverse

**Appendix H***Informed Consent Form of the Qualtrics Survey*

By clicking **YES** below, I agree to the following:

I understand that my participation is voluntary. I also understand that I have the right to withdraw my consent at any time without needing to give a reason, if I experience any discomfort or distress.

Furthermore, the following points are clear to me:

- All data that are collected by the researcher are treated completely anonymously and cannot and will not be traced back to my identity.
- I understand that information I provide will be used for research reports that aim to investigate the impact of doom scrolling on the topic of climate change impacts mental health.
- I am currently NOT receiving any kind of treatment (medical or therapy) for a mental disorder
- I have NOT had a suicide attempt in the last two years
- I am NOT currently suffering from suicidal ideation / thoughts
- I understand that taking part in the study involves the following risks: mental discomfort by talking about a sensitive topic such as climate change.
- I agree to keep the procedures and explanation of this study to myself and will not pass this information on to others because this might negatively influence the study results.
- I give permission for the answers that I provide to be archived in survey database so it can be used for future research and learning.

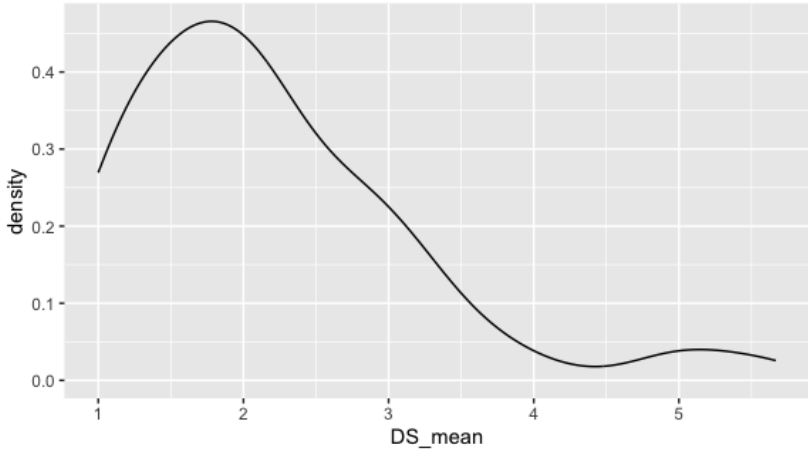
I agree to participate in the study:

- YES**, I fully understand the contents of this consent form and agree to participate in this study. I also agree not to disclose the details of the study to other parties.
- NO** (you will be directed to the end of the study)



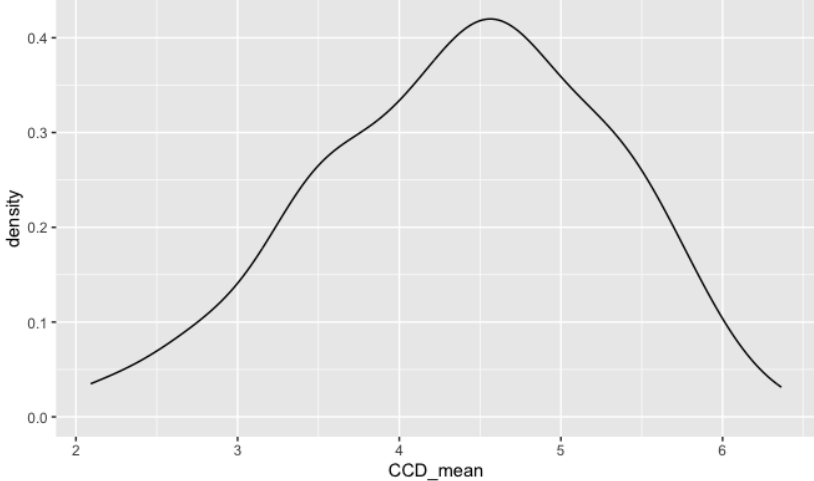
**Appendix I**

*Distribution of the DSS*



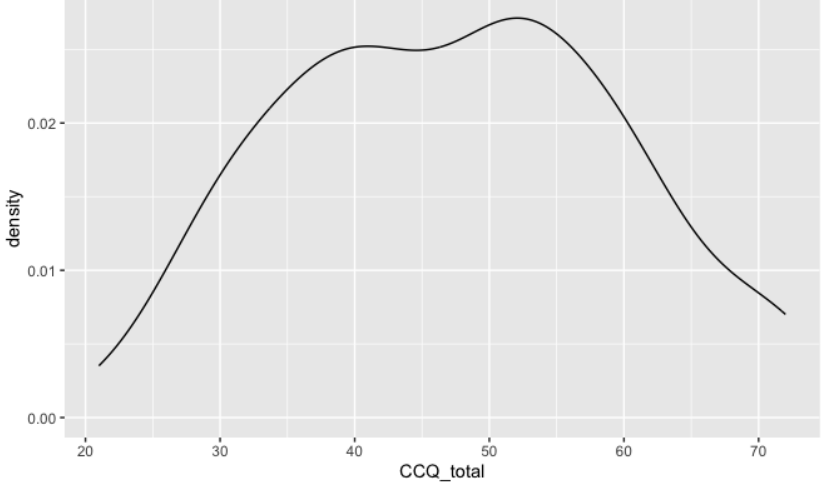
**Appendix J**

*Distribution of the CCDS*



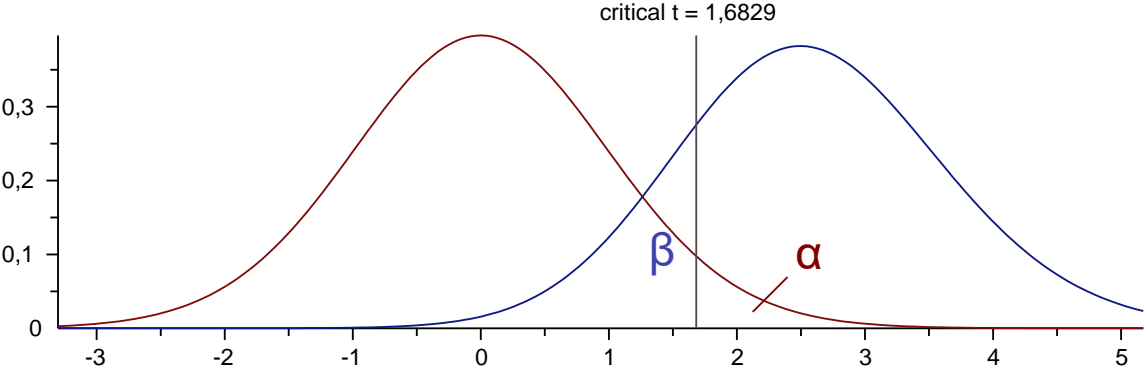
**Appendix K**

*Distribution of the CCQ*



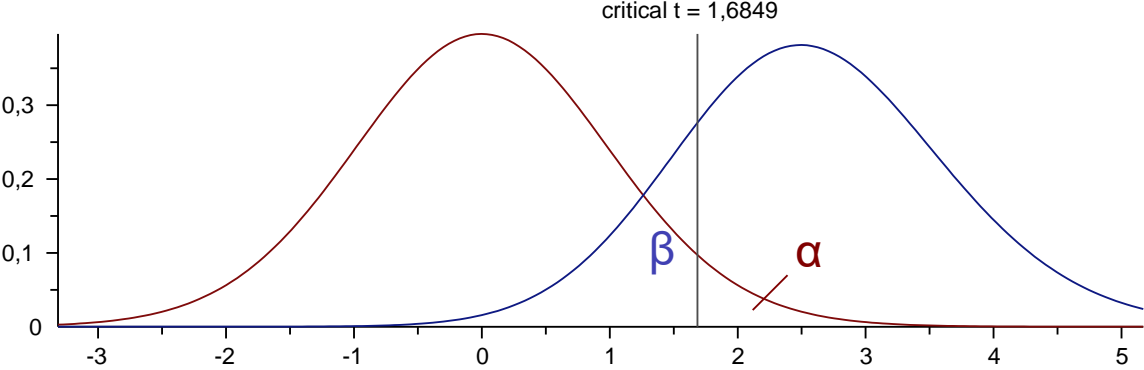
**Appendix L**

*Visual Representation of a Statistical Power Analysis with One Predictor*



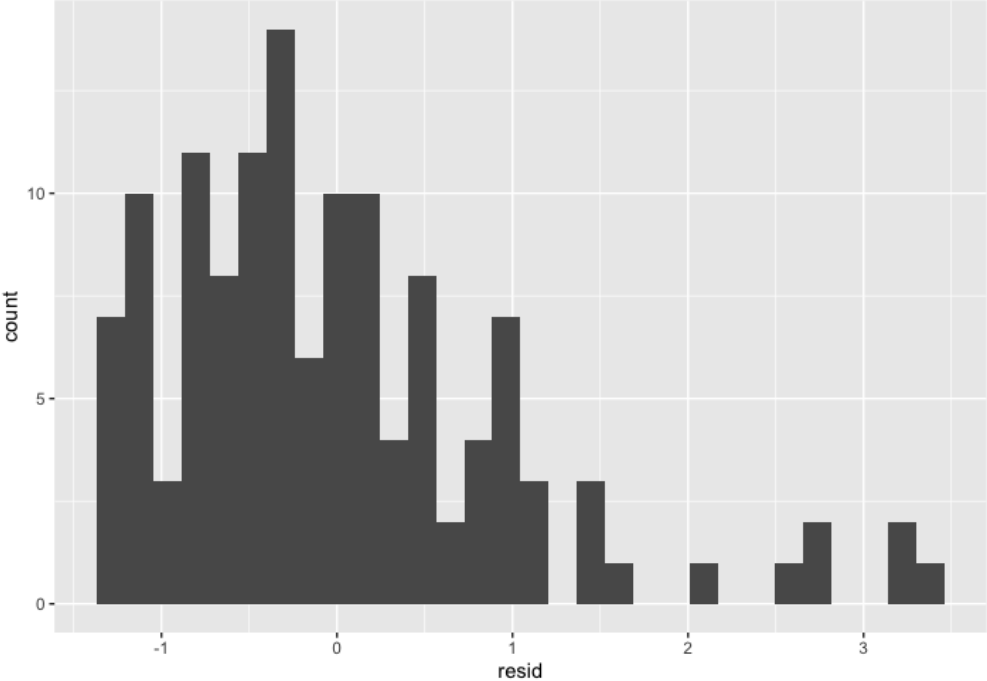
**Appendix M**

*Visual Representation of a Statistical Power Analysis with Three Predictors*



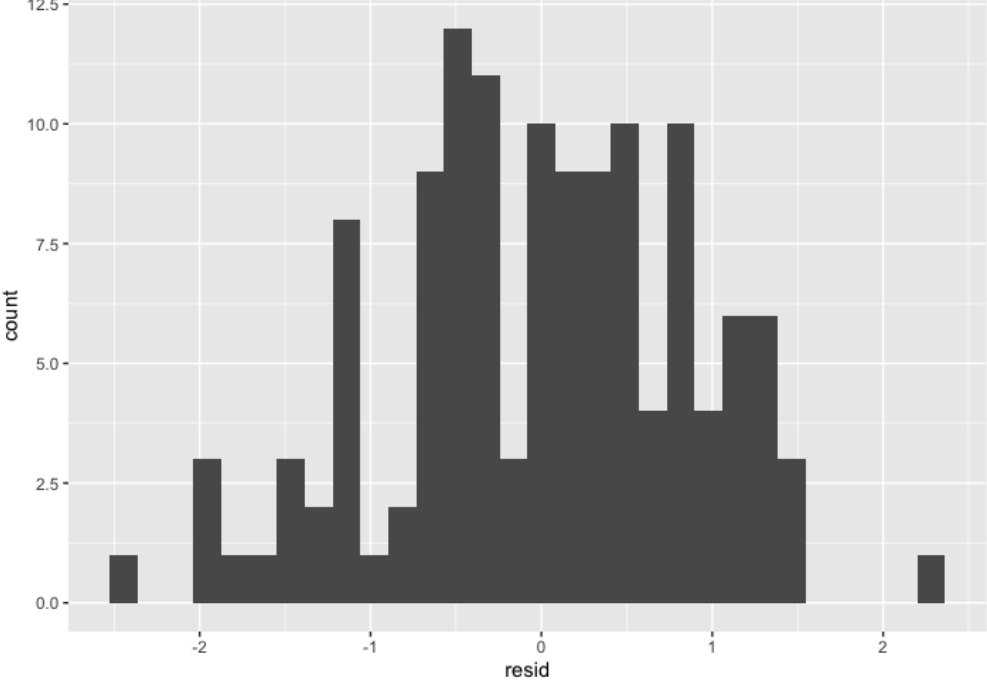
**Appendix N**

*Model A Histogram of the Residuals*



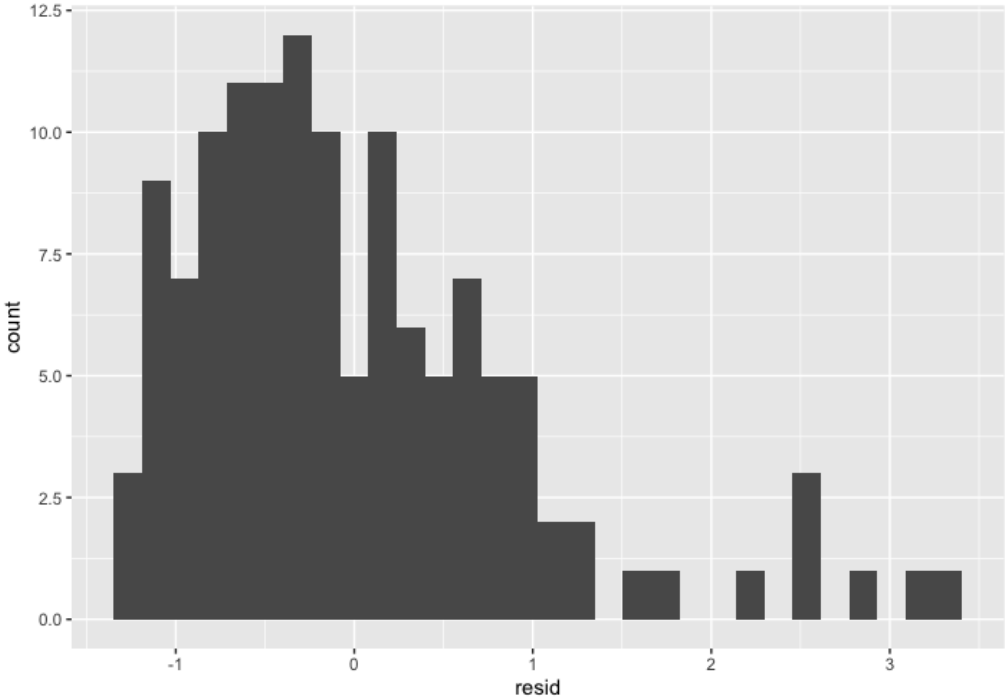
**Appendix O**

*Model B Histogram of the Residuals*



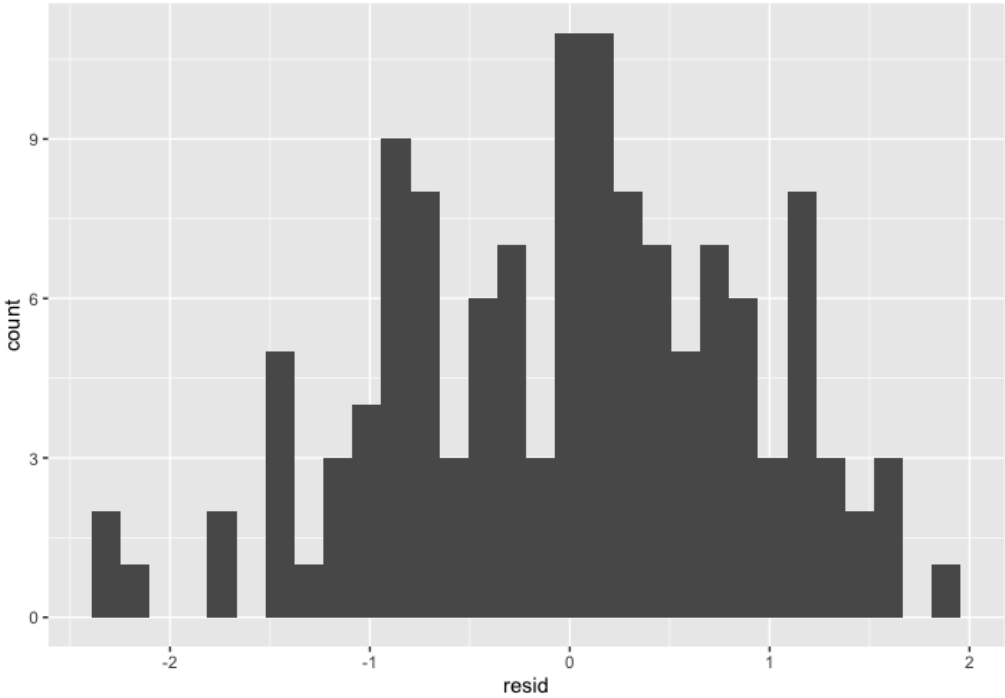
**Appendix P**

*Model C Histogram of the Residuals*



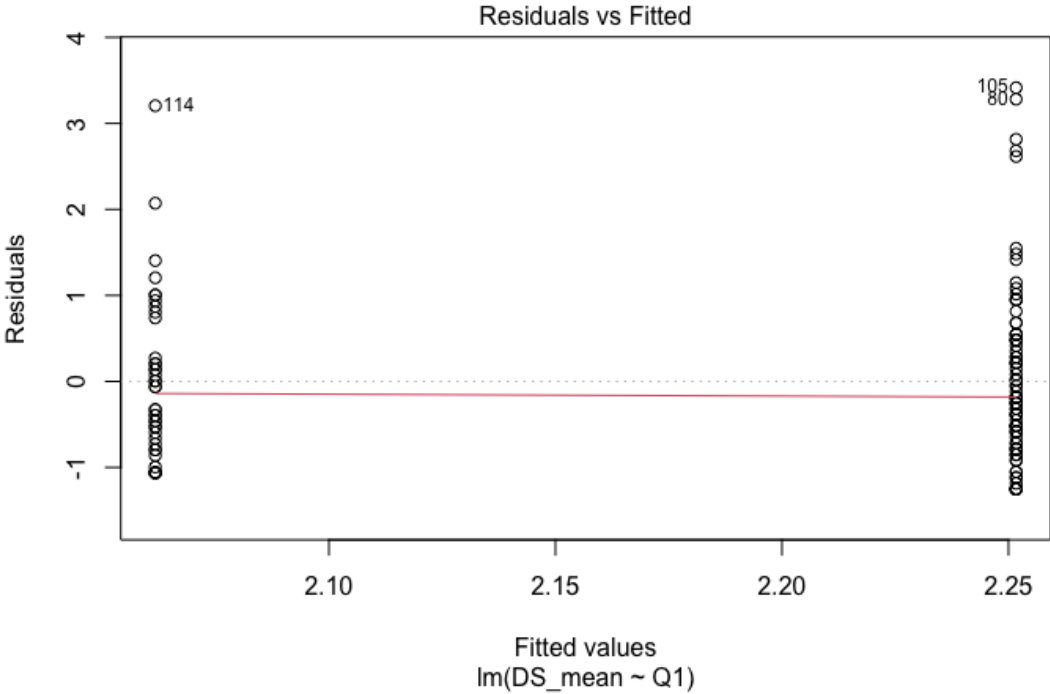
**Appendix Q**

*Model D Histogram of the Residuals*



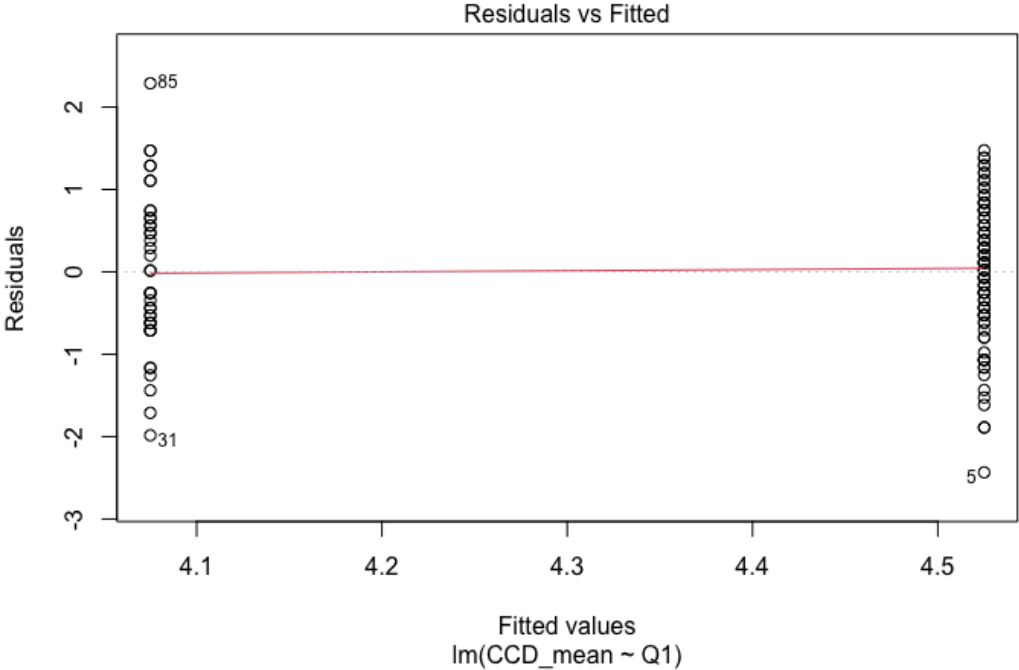
**Appendix R**

*Model A Residual versus Fitted Plot*



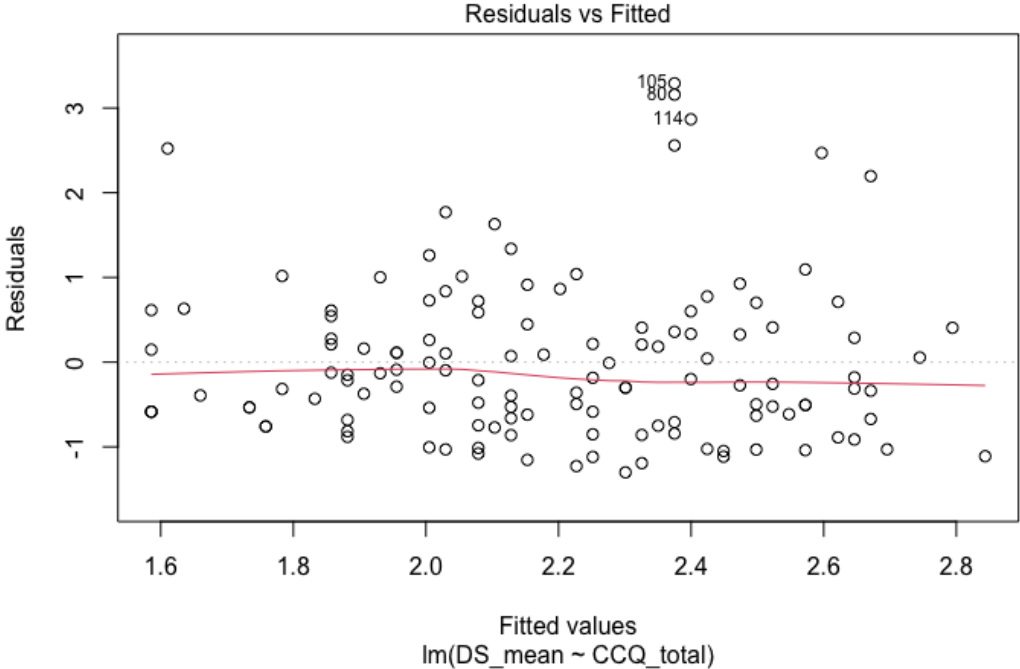
**Appendix S**

*Model B Residual versus Fitted Plot*



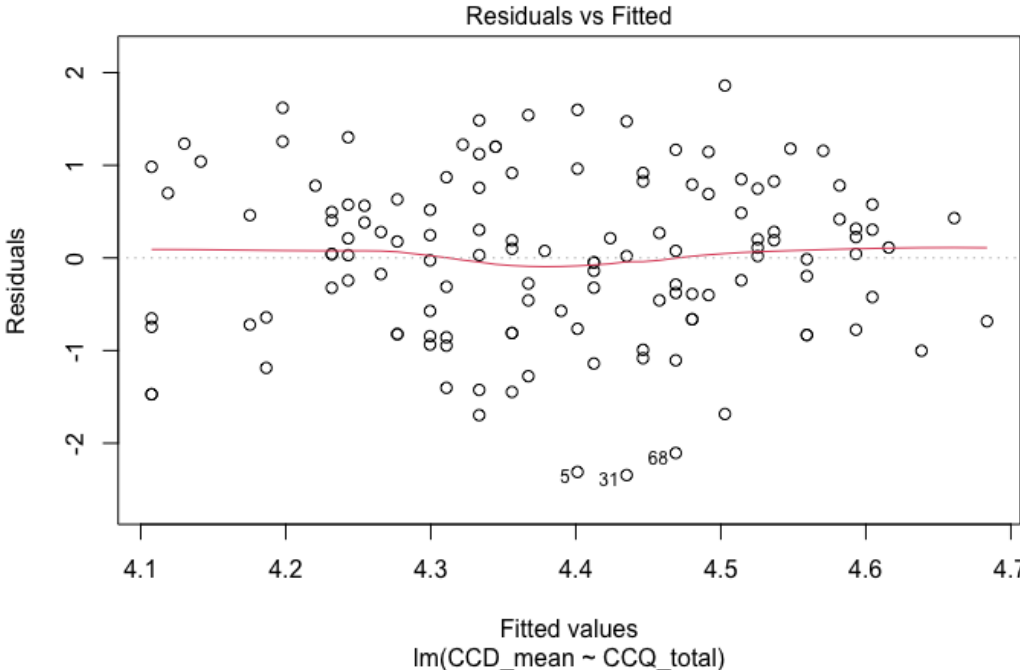
**Appendix T**

*Model C Residual versus Fitted Plot*



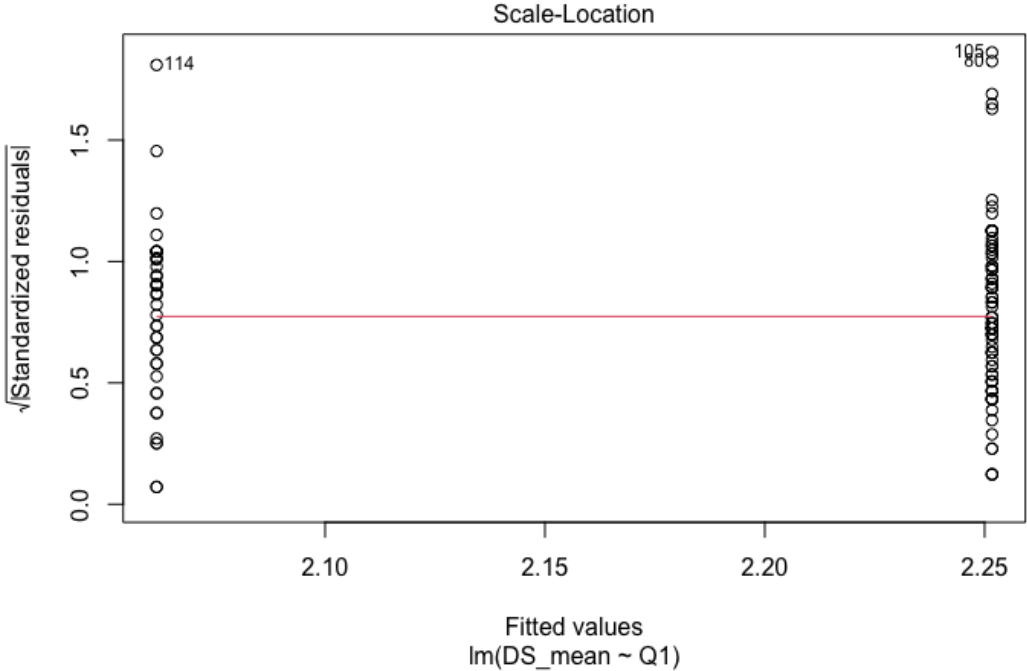
**Appendix U**

*Model D Residual versus Fitted Plot*



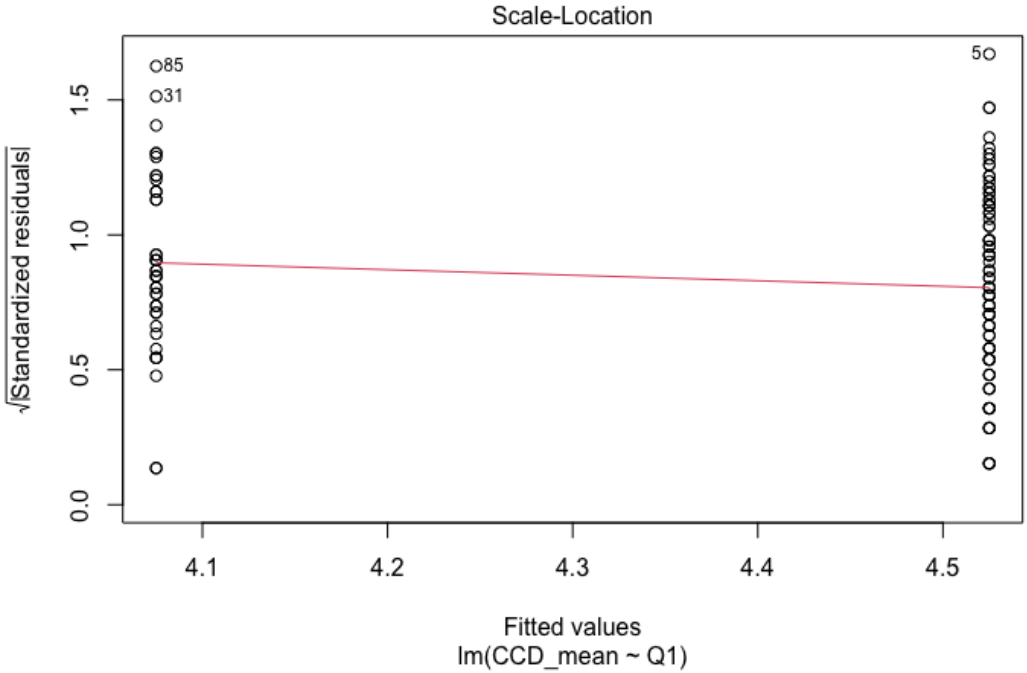
**Appendix V**

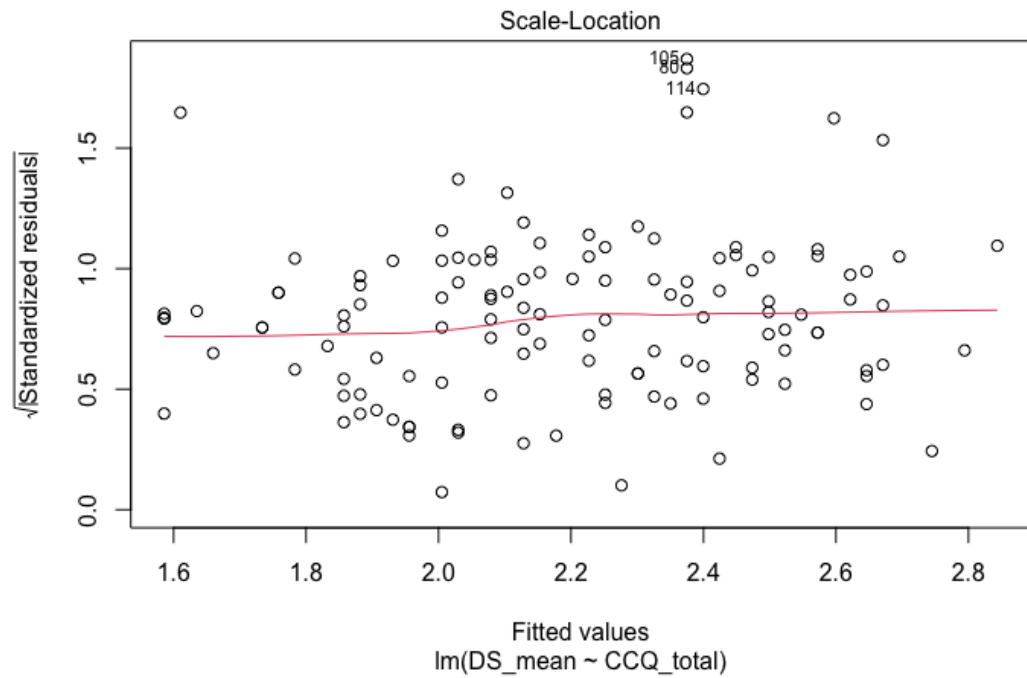
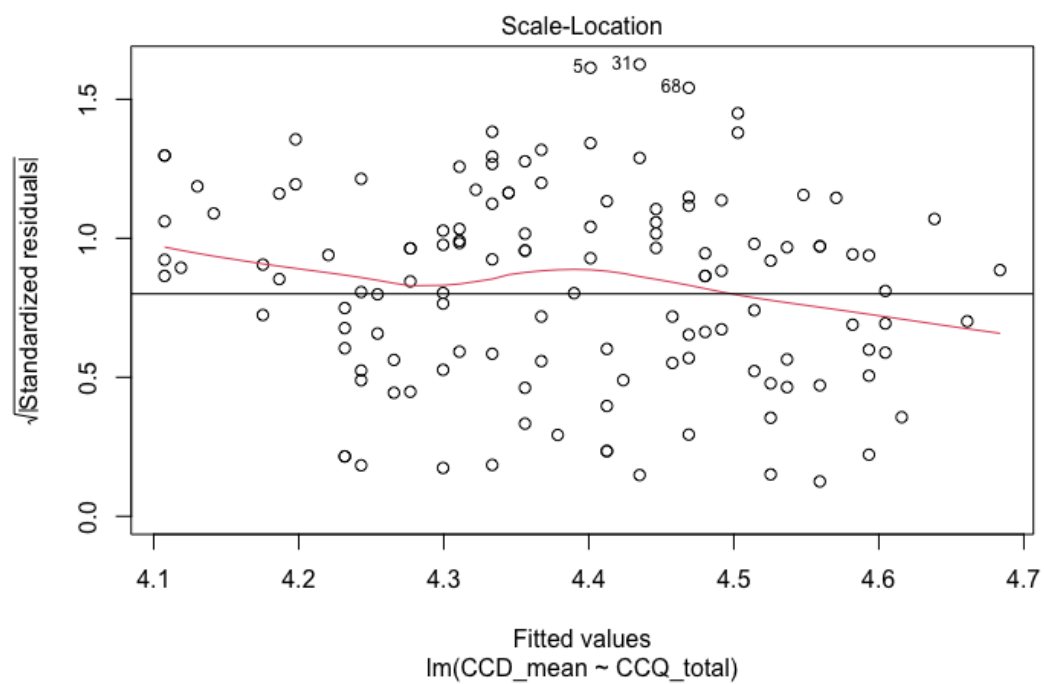
*Model A Scale-Location Plot*



**Appendix W**

*Model B Scale-Location Plot*



**Appendix X***Model C Scale-Location Plot***Appendix Y***Model D Scale-Location Plot*



**Appendix Z***R Script for the Statistical Analysis*

```

setwd("~/Downloads")

#necessary packages
install.packages("haven")
library(haven)
install.packages("tidyverse")
library(tidyverse)
install.packages("broom")
library(broom)
install.packages("tidyr")
library(tidyr)
install.packages("knitr")
library(knitr)
install.packages("lavaan")
library(lavaan)
install.packages("psych")
library(psych)
install.packages("MBESS")
library(MBESS)
library(dplyr)
install.packages("ltm")
library("ltm")
install.packages("stats")
library("stats")
install.packages("moments")
library(moments)
library("ggplot2")
install.packages("lmtest")
library(lmtest)

#A
#install dataset
CC_data <- read_sav("bachelor_dataset.sav")
view(CC_data)

# saving changes (if necessary):
# save.image("~/Downloads/Thesis.RData") <- saving the screen
save(CC_data, file = "Thesis_data.sav") #<- saving the dataset

#B
#this part is used to adjust the values of the dataset, if necessary
#delete unnecessary columns
CC_data <- CC_data[ ,
c("ResponseId", "Informed_Consent", "Q1", "Q2", "Q2_7_TEXT", "Q3", "Q4", "CCD_Q1",
"CCD_Q2",

"CCD_Q3", "CCD_Q4", "CCD_Q5", "CCD_Q6", "CCD_Q7", "CCD_Q8", "CCD_Q9", "CCD_Q10", "C
CD_Q11",

"DS_Q1", "DS_Q2", "DS_Q3", "DS_Q4", "DS_Q5", "DS_Q6", "DS_Q7", "DS_Q8", "DS_Q9", "DS
_Q10",

"DS_Q11", "DS_Q12", "DS_Q13", "DS_Q14", "DS_Q15", "CCQ_1", "CCQ_2", "CCQ_3", "CCQ_4
", "CCQ_5",

```

```
"CCQ_6", "CCQ_7", "CCQ_8", "CCQ_9", "CCQ_10", "CCQ_11", "CCQ_12", "identifier")]  
view(CC_data)  
  
#delete incomplete cases  
CC_data <- CC_data %>% drop_na()  
view(CC_data)  
  
#change nationality to character variable  
CC_data$Q4 <- CC_data$Q4 %>% as.character()  
summary(CC_data$Q4)  
  
table(CC_data$Q4)  
CC_data$Q4[CC_data$Q4 == "16"] <- "Australia"  
CC_data$Q4[CC_data$Q4 == "17"] <- "Austria"  
CC_data$Q4[CC_data$Q4 == "37"] <- "Brazil"  
CC_data$Q4[CC_data$Q4 == "87"] <- "France"  
CC_data$Q4[CC_data$Q4 == "95"] <- "Germany"  
CC_data$Q4[CC_data$Q4 == "118"] <- "Indonesia"  
CC_data$Q4[CC_data$Q4 == "127"] <- "Japan"  
CC_data$Q4[CC_data$Q4 == "155"] <- "Malaysia"  
CC_data$Q4[CC_data$Q4 == "165"] <- "Mexico"  
CC_data$Q4[CC_data$Q4 == "180"] <- "Netherlands"  
CC_data$Q4[CC_data$Q4 == "205"] <- "Poland"  
CC_data$Q4[CC_data$Q4 == "206"] <- "Portugal"  
CC_data$Q4[CC_data$Q4 == "211"] <- "Romania"  
CC_data$Q4[CC_data$Q4 == "247"] <- "Switzerland"  
CC_data$Q4[CC_data$Q4 == "249"] <- "Taiwan"  
CC_data$Q4[CC_data$Q4 == "267"] <- "UK"  
CC_data$Q4[CC_data$Q4 == "269"] <- "USA"  
CC_data$Q4[CC_data$Q4 == "274"] <- "Vietnam"  
  
#frequency table with percentages  
nationality <- table(CC_data$Q4)/length(CC_data$Q4)  
View(nationality)  
nationality_percent <- nationality*100  
View(nationality_percent)  
  
#gender %  
table(CC_data$Q1)  
  
#age distribution  
mean(CC_data$Q3)  
sd(CC_data$Q3)  
max(CC_data$Q3)  
min(CC_data$Q3)  
  
#education level  
table(CC_data$Q2)  
  
#make missing gender N/A  
CC_data["Q1"][CC_data["Q1"] == 4] <- NA  
  
#C  
#this step shows how to make total scores out of the several item scores:  
  
#reverse coding for CCQ (all items)
```

```

CC_data$CCQ_12<-as.character(CC_data$CCQ_12)
CC_data$CCQ_12[CC_data$CCQ_12 == "1"] <- "one"
CC_data$CCQ_12[CC_data$CCQ_12 == "2"] <- "two"
CC_data$CCQ_12[CC_data$CCQ_12 == "3"] <- "three"
CC_data$CCQ_12[CC_data$CCQ_12 == "4"] <- "four"
CC_data$CCQ_12[CC_data$CCQ_12 == "5"] <- "five"
CC_data$CCQ_12[CC_data$CCQ_12 == "6"] <- "six"

CC_data$CCQ_12[CC_data$CCQ_12 == "one"] <- "6"
CC_data$CCQ_12[CC_data$CCQ_12 == "two"] <- "5"
CC_data$CCQ_12[CC_data$CCQ_12 == "three"] <- "4"
CC_data$CCQ_12[CC_data$CCQ_12 == "four"] <- "3"
CC_data$CCQ_12[CC_data$CCQ_12 == "five"] <- "2"
CC_data$CCQ_12[CC_data$CCQ_12 == "six"] <- "1"
CC_data$CCQ_12<-as.numeric(CC_data$CCQ_12)

CC_data$CCQ_12<-as.numeric(CC_data$CCQ_12)
class(CC_data$CCQ_2)
CC_data <- CC_data %>% mutate(CCCQ_total = CCCQ_1 + CCCQ_2 + CCCQ_3 +
                             CCCQ_4 + CCCQ_5 + CCCQ_6 + CCCQ_7 +
                             CCCQ_8 + CCCQ_9 + CCCQ_10 + CCCQ_11 +
                             CCCQ_12)
CC_data$CCCQ_total<-as.numeric(CC_data$CCCQ_total)

CC_data <- CC_data %>% mutate(DS_total = DS_Q1 + DS_Q2 + DS_Q3 +
                             DS_Q4 + DS_Q5 + DS_Q6 + DS_Q7 +
                             DS_Q8 + DS_Q9 + DS_Q10 + DS_Q11 +
                             DS_Q12 + DS_Q13 + DS_Q14 + DS_Q15)
CC_data$DS_total<-as.numeric(CC_data$DS_total)

#reverse coding for item 3, 4, and 10
CC_data$CCD_Q3<-as.character(CC_data$CCD_Q3)
CC_data$CCD_Q3[CC_data$CCD_Q3 == "1"] <- "one"
CC_data$CCD_Q3[CC_data$CCD_Q3 == "2"] <- "two"
CC_data$CCD_Q3[CC_data$CCD_Q3 == "3"] <- "three"
CC_data$CCD_Q3[CC_data$CCD_Q3 == "5"] <- "five"
CC_data$CCD_Q3[CC_data$CCD_Q3 == "6"] <- "six"
CC_data$CCD_Q3[CC_data$CCD_Q3 == "7"] <- "seven"

CC_data$CCD_Q3[CC_data$CCD_Q3 == "one"] <- "7"
CC_data$CCD_Q3[CC_data$CCD_Q3 == "two"] <- "6"
CC_data$CCD_Q3[CC_data$CCD_Q3 == "three"] <- "5"
CC_data$CCD_Q3[CC_data$CCD_Q3 == "five"] <- "3"
CC_data$CCD_Q3[CC_data$CCD_Q3 == "six"] <- "2"
CC_data$CCD_Q3[CC_data$CCD_Q3 == "seven"] <- "1"
CC_data$CCD_Q3<-as.numeric(CC_data$CCD_Q3)

CC_data$CCD_Q4<-as.character(CC_data$CCD_Q4)
CC_data$CCD_Q4[CC_data$CCD_Q4 == "1"] <- "one"
CC_data$CCD_Q4[CC_data$CCD_Q4 == "2"] <- "two"
CC_data$CCD_Q4[CC_data$CCD_Q4 == "3"] <- "three"
CC_data$CCD_Q4[CC_data$CCD_Q4 == "5"] <- "five"
CC_data$CCD_Q4[CC_data$CCD_Q4 == "6"] <- "six"
CC_data$CCD_Q4[CC_data$CCD_Q4 == "7"] <- "seven"

CC_data$CCD_Q4[CC_data$CCD_Q4 == "one"] <- "7"
CC_data$CCD_Q4[CC_data$CCD_Q4 == "two"] <- "6"

```

```

CC_data$CCD_Q4[CC_data$CCD_Q4 == "three"] <- "5"
CC_data$CCD_Q4[CC_data$CCD_Q4 == "five"] <- "3"
CC_data$CCD_Q4[CC_data$CCD_Q4 == "six"] <- "2"
CC_data$CCD_Q4[CC_data$CCD_Q4 == "seven"] <- "1"
CC_data$CCD_Q4<-as.numeric(CC_data$CCD_Q4)

CC_data$CCD_Q10<-as.character(CC_data$CCD_Q10)
CC_data$CCD_Q10[CC_data$CCD_Q10 == "1"] <- "one"
CC_data$CCD_Q10[CC_data$CCD_Q10 == "2"] <- "two"
CC_data$CCD_Q10[CC_data$CCD_Q10 == "3"] <- "three"
CC_data$CCD_Q10[CC_data$CCD_Q10 == "5"] <- "five"
CC_data$CCD_Q10[CC_data$CCD_Q10 == "6"] <- "six"
CC_data$CCD_Q10[CC_data$CCD_Q10 == "7"] <- "seven"

CC_data$CCD_Q10[CC_data$CCD_Q10 == "one"] <- "7"
CC_data$CCD_Q10[CC_data$CCD_Q10 == "two"] <- "6"
CC_data$CCD_Q10[CC_data$CCD_Q10 == "three"] <- "5"
CC_data$CCD_Q10[CC_data$CCD_Q10 == "five"] <- "3"
CC_data$CCD_Q10[CC_data$CCD_Q10 == "six"] <- "2"
CC_data$CCD_Q10[CC_data$CCD_Q10 == "seven"] <- "1"
CC_data$CCD_Q10<-as.numeric(CC_data$CCD_Q10)

CC_data$CCD_Q11<-as.numeric(CC_data$CCD_Q11)

CC_data <- CC_data %>% mutate(CCD_total = CCD_Q1 + CCD_Q2 + CCD_Q3 +
                             CCD_Q4 + CCD_Q5 + CCD_Q6 + CCD_Q7 +
                             CCD_Q8 + CCD_Q9 + CCD_Q10 + CCD_Q11)

#D
#calculating Cronbach's alpha for each survey
DS <- data.frame(CC_data$DS_Q1, CC_data$DS_Q2, CC_data$DS_Q3,
                 CC_data$DS_Q4, CC_data$DS_Q5,
                 CC_data$DS_Q6, CC_data$DS_Q7, CC_data$DS_Q8,
                 CC_data$DS_Q9, CC_data$DS_Q10,
                 CC_data$DS_Q11, CC_data$DS_Q12, CC_data$DS_Q13,
                 CC_data$DS_Q14, CC_data$DS_Q15)
cronbach.alpha(DS, CI = TRUE)
#alpha: 0.921

CCQ <- data.frame(CC_data$CCQ_1, CC_data$CCQ_2, CC_data$CCQ_3,
                 CC_data$CCQ_4, CC_data$CCQ_5,
                 CC_data$CCQ_6, CC_data$CCQ_7, CC_data$CCQ_8,
                 CC_data$CCQ_9, CC_data$CCQ_10,
                 CC_data$CCQ_11, CC_data$CCQ_12)
cronbach.alpha(CCQ, CI = TRUE)
#alpha: 0.937

CCD <- data.frame(CC_data$CCD_Q1, CC_data$CCD_Q2, CC_data$CCD_Q3,
                 CC_data$CCD_Q4, CC_data$CCD_Q5,
                 CC_data$CCD_Q6, CC_data$CCD_Q7, CC_data$CCD_Q8,
                 CC_data$CCD_Q9, CC_data$CCD_Q10,
                 CC_data$CCD_Q11)
cronbach.alpha(CCD, CI = TRUE)
# alpha: 0.746

#alpha score for DS and CDD together to validate the "new scale"

```

```

Doomsc <- data.frame(CC_data$CCD_Q1, CC_data$CCD_Q2, CC_data$CCD_Q3,
CC_data$CCD_Q4, CC_data$CCD_Q5,
                    CC_data$CCD_Q6, CC_data$CCD_Q7, CC_data$CCD_Q8,
CC_data$CCD_Q9, CC_data$CCD_Q10,
                    CC_data$CCD_Q11, CC_data$DS_Q1, CC_data$DS_Q2,
CC_data$DS_Q3, CC_data$DS_Q4, CC_data$DS_Q5,
                    CC_data$DS_Q6, CC_data$DS_Q7, CC_data$DS_Q8,
CC_data$DS_Q9, CC_data$DS_Q10,
                    CC_data$DS_Q11, CC_data$DS_Q12, CC_data$DS_Q13,
CC_data$DS_Q14, CC_data$DS_Q15)
cronbach.alpha(Doomsc, CI = TRUE)
#alpha: 0.884

#mutate DS score to means & then to standard score
CC_data <- CC_data %>% mutate(DS_mean = DS_total/15)
CC_data <- CC_data %>% mutate(DS_standard = scale(DS_mean))

#same with CCD
CC_data <- CC_data %>% mutate(CCD_mean = CCD_total/11)
CC_data <- CC_data %>% mutate(CCD_standard = scale(CCD_mean))

#add DS and CCD together to get overall doomscrolling score
CC_data <- CC_data %>% mutate(General_Doomsc = CCD_mean + DS_mean)

#standard scores of CCQ will be used
CC_data <- CC_data %>% mutate(CCQ_standard = scale(CCQ_total))

#delete case that is neither male nor female
CC_data <- CC_data[-79,]

#E
#as a first step, the assumptions will be tested.

install.packages("modelr")
library(modelr)

#make gender a categorical variable with male and female
CC_data$Q1 <- as.character(CC_data$Q1)
CC_data$Q1[CC_data$Q1 == "1"] <- "male"
CC_data$Q1[CC_data$Q1 == "2"] <- "female"
table(CC_data$Q1)

#make 3 linear models (one model for each relationship of the variables)
assumption_modelA <- lm(DS_mean ~ Q1, data = CC_data)
assumption_modelB <- lm(CCD_mean ~ Q1, data = CC_data)
assumption_modelC <- lm(DS_mean ~ CCQ_total, data = CC_data)
assumption_modelD <- lm(CCD_mean ~ CCQ_total, data = CC_data)

#residuals
residA <- resid(assumption_modelA)
residB <- resid(assumption_modelB)
residC <- resid(assumption_modelC)
residD <- resid(assumption_modelD)

#descriptive data
# mean
mean(CC_data$DS_mean)

```

```
mean(CC_data$CCQ_total)
mean(CC_data$CCD_mean)

# sd
sd(CC_data$DS_mean)
sd(CC_data$CCQ_total)
sd(CC_data$CCD_mean)

#density plots
p <- ggplot(CC_data, aes(x=CCD_mean)) + geom_density()
p
#skewness
skewness(CC_data$DS_mean)
skewness(CC_data$CCQ_total)
skewness(CC_data$CCD_mean)

#correlations
cor(CC_data$DS_mean, CC_data$CCD_mean, use = "complete.obs")
cor(CC_data$DS_mean, CC_data$CCQ_total, use = "complete.obs")
cor(CC_data$DS_mean, CC_data$sex_female, use = "complete.obs")
cor(CC_data$CCD_mean, CC_data$sex_female, use = "complete.obs")
cor(CC_data$CCD_mean, CC_data$CCQ_total, use = "complete.obs")
cor(CC_data$CCQ_total, CC_data$sex_female, use = "complete.obs")

#1 normality
#normality of the residuals is tested with histograms of the assumption
models and skewness rates of those histograms
CC_data %>%add_residuals(assumption_modelA) %>%
  ggplot(aes(x = resid)) +
  geom_histogram()

CC_data %>%add_residuals(assumption_modelB) %>%
  ggplot(aes(x = resid)) +
  geom_histogram()

CC_data %>%add_residuals(assumption_modelC) %>%
  ggplot(aes(x = resid)) +
  geom_histogram()

CC_data %>%add_residuals(assumption_modelD) %>%
  ggplot(aes(x = resid)) +
  geom_histogram()

# skewness testing
skewness(assumption_modelA$residuals)
skewness(assumption_modelB$residuals)
skewness(assumption_modelC$residuals)
skewness(assumption_modelD$residuals)

#2 linearity
#linearity is tested with residual vs fitted plots
plot(assumption_modelA, 1)
plot(assumption_modelB, 1)
plot(assumption_modelC, 1)
plot(assumption_modelD, 1)
```

```
#3 homoscedasticity
#homoscedacity is measured with a scale-location plot
plot(assumption_modelA, 3)
plot(assumption_modelB, 3)
plot(assumption_modelC, 3)
plot(assumption_modelD, 3)
abline(h=.80)

#4 independence / multicollinearity
#independence is tested with a Durbin Watson test
dwtest(assumption_modelA)
dwtest(assumption_modelB)
dwtest(assumption_modelC)
dwtest(assumption_modelD)

#HYPOTHESES TESTING
#assumption of normality is not met, so I transform the data from the
DS_mean
#to log(DS_mean)
CC_data$DS_log=log(CC_data$DS_mean)

#Hypothesis 1A
#make dummy variable
CC_data <- CC_data %>% mutate(sex_female = ifelse(Q1 == "female", 1, 0))
#male is the reference group

#code to create the linear model
hypothesis_model1A <- lm(DS_log ~ sex_female, data = CC_data)
hypothesis_model1A %>% tidy(conf.int = TRUE, conf.level = 0.95)

#Hypothesis 1B
hypothesis_model1B <- lm(CCD_mean ~ sex_female, data = CC_data)
hypothesis_model1B %>% tidy(conf.int = TRUE, conf.level = 0.95)

#Hypothesis 2A
hypothesis_model2A <- lm(DS_log ~ CCQ_total, data = CC_data)
hypothesis_model2A %>% tidy(conf.int = TRUE, conf.level = 0.95)

#Hypothesis 2B
hypothesis_model2B <- lm(CCD_mean ~ CCQ_total, data = CC_data)
hypothesis_model2B %>% tidy(conf.int = TRUE, conf.level = 0.95)

#Hypothesis 3A
hypothesis_model3A <- CC_data %>% lm(DS_log ~ CCQ_total + sex_female +
CCQ_total:sex_female, data = .)
hypothesis_model3A %>% tidy(conf.int = TRUE, conf.level = .95)

#Hypothesis 3B
hypothesis_model3B <- CC_data %>% lm(CCD_mean ~ CCQ_total + sex_female +
CCQ_total:sex_female, data = .)
hypothesis_model3B %>% tidy(conf.int = TRUE, conf.level = .95)
```