

**The Influence of Depression on Doom Scrolling and Climate Change Engagement: A
Mixed-Methods Study**

Lisanne te Pas (s2624273)

Department of Psychology, University of Twente

Faculty of Behavioural, Management, and Social Sciences

Bachelor's Thesis Research

Supervisor: Dr. A. Dominguez Rodriguez

Second Supervisor: Dr. A. van der Zeeuw

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Abstract

Doom scrolling is a relatively new term and can be understood as a vicious cycle of seeking negative information to conform with one's negative beliefs about a certain topic, decreasing one's mental well-being. Elevated levels of depression could be an indicator for the need to get stuck in the vicious cycle of doom scrolling in general and doom scrolling on the specific topic of climate change. Young adults were expected to be more vulnerable for this effect. This study used the sequential explanatory mixed methods design. Qualitative data was gathered through interviews (N = 15), followed creating 13 themes related to climate change doom scrolling through thematic analysis. This led to the development of the Climate Change Doom Scrolling Scale (CCDS). Quantitative data was collected via a survey which included the CCDS, Doom Scrolling Scale (DSS) and Beck's Depression Inventory (BDI) (N = 130). Results showed a relationship between elevated levels of depression and the need to doom scroll in general ($\beta = 0.13$, $SE = 0.034$, $p = <.001$), however, no relationship was found between elevated levels of depression and the need to doom scroll on the topic of climate change ($\beta = .02$, $SE = .038$, $p = .55$). Additionally, age was not considered as an initiator for both of the effects ($\beta = .002$, $SE = .005$, $p = .7$) and ($\beta = .01$, $SE = .004$, $p = .18$). Implications for the results this study were potentially due to factors such as participants' perceived privilege of living area, detachment from climate change news and the sample's younger age

composition. Future research could explore diverse populations and consider factors like social-economic status and age-related vulnerabilities.

Keywords: doom scrolling, climate change, depression, mixed-methods, negative news consumption.

1. Introduction

With the emerge of the SARS-CoV-2 (Covid-19), the use of technological devices has increased. The pandemic required that people socially distanced themselves to not spread the virus any further. This resulted in using technological devices such as computers, laptops, smart phones and tablets to be on the internet more, and that way be able to keep having as much social contact as possible. Next to the social contact that technological devices provided, people also felt the need to protect themselves from the unknown danger caused by Covid-19 and felt the need to keep control over the situation through scrolling on their technological devices in the search for information and news (Satici et al., 2022). However, most of the news provided during the lockdown were mostly negative and resulted in people getting more stuck into uncomfortable thoughts (Satici et al., 2022).

Doom Scrolling

Doom scrolling, also known as doom surfing, is a relatively new term and mainly as a result of increased use of technological devices during the Covid-19 pandemic (Jennings, 2020). However, the phenomenon of doom scrolling has been observed before, often referred to as ‘negativity bias’ which argues that individuals could have a (often unconscious) preference for negative news, which can result in paying close attention to the negative news (Van Der Meer et al., 2020). In the last years, there has been a big transition from traditional mass media consumption (radio, television, newspapers) to social media consumption (Boykoff, 2011). This shift also includes big changes in how people perceive and interact with the news information they get access to on their electronic devices (Boykoff, 2011).

The Merriam-Webster dictionary defines ‘doom scrolling’ as “the tendency to continue to surf or scroll through bad news, even though that news is saddening, disheartening or depressing” (Merriam-Webster, 2020). This definition can be understood as a vicious cycle of seeking negative information about some threatening situation, feeling more anxious about it and as a result looking up even more negative information to conform their feelings and trying to gain a certain feeling of control over the situation (Satici et al., 2022). In addition, the online algorithm of the users is tailored to their search results, and therefore also sorts the

news that they will get to see without an exact point where the doom scrolling session could end (Van Drunen et al., 2019). Furthermore, as found in a study conducted by Vannucci et al. (2017), high social media use negatively influences mental health by increasing anxiety symptoms which could result in mental disorders. This indicates that being 'online' or using technological devices to look for news could impact individuals' mental health.

Determinants of Doom Scrolling

Doom scrolling seems to be based on factors which motivate the attendance and the seeking for negative news, which could include anxiety, vigilance and uncertainty. These factors are usually strengthened by factors on an individual level, technological level (algorithms) and social context level (politics) (Sharma et al., 2022). Previous research has shown that individual differences, media behaviour of individuals and current state of well-being can all influence the doom scrolling behaviour significantly. For example, problematic smartphone use has been positively correlated with the personality trait neuroticism (Horwood & Anglim, 2018), and shows therefore that different personality traits can influence doom scrolling behaviour. This also goes for the time spent on social media platforms, such as Twitter, Facebook and Instagram, where news is shown frequently. Next, focusing on negative news may negatively influence an individuals' wellbeing, however, the negative feeling of well-being might also influence the seeking of negative information even more (Zhao & Zhou, 2020), indicating a vicious cycle that will only influence an individuals' mental health more and more. Furthermore, due to the negativity bias, negative information tends to weigh more heavily on the human brain than positive information does (Soroka et al., 2019). This indicates the negative news that is being shown while scrolling on electronic devices tend to grasp the attention of the user more and therefore could emerge them into the vicious circle of doom scrolling.

Climate Change and Its Effects on Individuals

Climate change is a significantly social represented phenomenon, (environmental) threat, and the risk factor of societal and environmental change. In addition, climate change can be considered as a 'chronic environmental stressor' which brings constant, but uncertain, possible dangerous consequences (Reser et al., 2011). Climate change is already happening, with its effects already sensible such as wildfires, heatwaves, floods, drought and hurricanes (Watts et al., 2019). More slower changes, which are less visible in the short term, are the changes in temperature, precipitation and sea level (Watts et al., 2019). Factors like the increased heat, vector- and water-borne diseases, malnutrition due to natural disasters and forced migration and conflict due to the weather changes are threatening human wellbeing

(Watts et al., 2019). Therefore, it can be said that there is a link between climate change and mental health. All of these changes in the climate can cause increased levels of anxiety, depression, post-traumatic stress syndrome (PTSD) and substance abuse. Next to that, hurricanes, flooding, earthquakes and more like these natural disasters have an impact on the infrastructure, and challenge the economic, educational, medical and transportation systems strongly (Clayton, 2020).

‘Climate anxiety’, also known as ‘eco-anxiety’, is a phenomenon that stresses the challenging emotions which are experienced due to issues in the environment and could be considered as threats (Pihkala, 2020). Climate anxiety can cause health problems, both physical and psychological. The physical effects of climate change can be injuries, vector-borne diseases, heat strokes, asthma, allergies, malnutrition, chronic lung disease, reduced fitness etc. The mental health can be lowered by climate change in forms of depression, stress, anxiety, complicated grief, substance abuse, loss of personal identity, helplessness etc. (Pihkala, 2020). On the social level, climate change can also cause problems, which could be economic inequality, reduced availability of healthcare and lowered social cohesion (Pihkala, 2020). This all indicates that climate change can cause individuals to experience threatening physical and psychological states.

Climate Change and Depression

As shown above, climate change seems to be related to lowered mental well-being. Previous research concluded that the temperature rise due to climate change can be linked to an increase of mental illness problems (Xue et al., 2019). Mental illness is a leading cause of increased disability worldwide, according to the World Health Organization (WHO), with mental illness problems being 13% of the global burden of disease (Atnafie et al., 2020). Depression or depressive disorder is one of the most common types of mental illness, and with its raising number has grown into an increasing health issue. With the prevalence of depression globally of approximately 280 million people in the world, it needs to be considered as a serious health condition (World Health Organization: WHO, 2021). When not treated or being worked on, depression can lead to suicide. Depression has been shown to be the cause of about 800,000 death due suicide per year (World Health Organization: WHO, 2021).

Events related to climate change have been linked to the frequency and number of admissions for mental disease hospitalizations, the level of distress experienced by mentally impaired patients, and the severity of their symptoms according to a study conducted by Hayes et al. 2018. Additionally, it was found that climate change can be a trigger for

developing depressive symptoms (Hayes et al., 2018). Climate change is also a factor for the rising of depressive feelings as long-term distress can develop by the constant awareness of the impacts and threats of climate change on the wellbeing of the people and the earth itself (Hayes et al., 2018). This is also because both physical and mental health are formed by ecological and social factors which influence (or often enlarge) other factors of health, such as climate change (Hayes et al., 2018). Direct psychosocial consequences of climate change could include trauma due to the extreme weather events. Indirect consequences of climate change that affect mental health occur because of the disruptions (on social, environmental and economic level) due to the changing climate (Hayes et al., 2018). Research has found a link between extreme heat and mental disorders (Wang & Horton, 2015). This is mainly because mental health problems related to heat tends to be found most often in people who have an impaired thermoregulation. Additionally, the increased risk of natural disasters such as wildfires due to the extreme heat directly impact mental wellbeing (Bryant et al., 2018).

Doom Scrolling and Depression

Even though not much research has been done on the topic of depression and doom scrolling, there tend to be a link between the two. People with depressive feelings focus on self-depreciation, which can lead to not only negative beliefs about themselves, but also about the future and the world itself (Eysenck & Fajkowska, 2017). As doom scrolling can be described as the vicious cycle of looking up negative information in order to conform the way one is feeling about a certain thing (Satici et al., 2022), people with depressive thoughts are at higher risk for getting stuck in the vicious cycle of doom scrolling to conform their negative feelings and looking up negative information which is line with their thoughts. Next to that, depression seems to be linked to a negative memory bias, where negative thoughts are more accessible in the memory than positive ones (Eysenck & Fajkowska, 2017). This also makes it easier for people with depressive thoughts and symptoms to start looking for negative information online and getting stuck in doom scrolling, as the negative thoughts are more present in their minds than positive ones. So, it can be stated that people with depressive symptoms could more easily get stuck in the vicious cycle of doom scrolling.

Age and Depression

As shown above, depression could be an indicator for the need to doom scroll more. To specify, depression also tend to correlate with a certain age group. According to the data from CDC in 2019, 21% of the total percentage of adults in the age group of 18-29 years old experienced symptoms of depression that were mild, moderate or severe (Villarroel & Terlizzi, 2020). In addition, the percentage of adults who experienced only mild symptoms of

depression was the highest in that age group (13,9%), in comparison to the older age groups (with a mean from the three older groups of 11%) (Villarroel & Terlizzi, 2020). The more severe depressive symptoms were a bit higher in the older age group (45-64 years old) (Villarroel & Terlizzi, 2020). So, as the symptoms are milder for the young adults, they are experienced way more often than for the older adults, which makes the age group of 18-29 years old the most vulnerable to depression. This can occur due to the low self-esteem that young adults might struggle with. Other risk factors for depression in young adulthood could include living alone, smoking, lower income, less physical activity family history, lower level of education, adverse childhood experiences, poor sleep, hormone changes, negative bias about their abilities, and adverse life events (Daze, 2023).

The Present Study

Doom scrolling is a relatively new term and current research mostly focuses on the Covid-19 pandemic, with no to little research on this phenomenon on the context of climate change. However, as shown the existing research above, climate change is a threat which could be a factor for people to get stuck in the vicious circle of doom scrolling and with that impact their (mental) health. Therefore, the aim of the current research is to find out what effect depression has on the need to doom scroll in general and on the topic of climate change. The research on this topic can be considered necessary as climate change is among us and will stay among us for approximately 30 years (National Geographic Society, 2022). Next to that, as most depressive symptoms are found in the age range of young adults (between 18 and 29 years old) (Villarroel & Terlizzi, 2020)., it is expected that young adults are more likely to doom scroll in general.

Hypothesis 1a: Doom scrolling is positively associated with elevated levels of depression.

According to the literature research conducted on the link between climate change and increased levels of depression, it is also expected that doom scrolling on the specific topic of climate change is associated with elevated levels of depression.

Hypothesis 1b: Climate change doom scrolling is positively associated with elevated levels of depression.

Age is expected to be an influence in both the effect of doom scrolling on depression, and climate change doom scrolling on depression, as young people might be more vulnerable to the negative effect of climate change as their coping capacity is not completely developed (Sussman & Lee, 2017).

Hypothesis 2: The effect of depression on the elevated levels of doom scrolling in general and doom scrolling on the topic of climate change is more likely in young adults (18-29 years old).

Therefore, the research question is: “What effect does depression have on climate change doom scrolling in young adults? In order to answer this research question, a mixed-methods research is used. Mixed methods research aims to better understand the research problem by combining the qualitative and quantitative approach (Babbie, 2015). This study used the sequential explanatory mixed methods design, which consist of two phases (Creswell & Creswell, 2017). The rationale for mixing both qualitative and quantitative data is that researching a relative new concept such as doom scrolling on the topic of climate change, using only one of the methods might not be sufficient enough. However, when used in combination, qualitative and quantitative data can complement each other and could result in a more complete analysis (Van Griensven et al., 2014). In the first phase (study 1), qualitative data is collected by conducting interviews, followed by an analysis. The goal of the first phase was to find patterns within the interviews, to be able to create themes which eventually were converted to a Climate Change Doom scrolling scale (CCDS), that was included in the survey during the second phase. The second phase (study 2), the quantitative, numeric data has been collected by creating a survey which included multiple scales, including the CCDS. These two phases result in a final interpretation and conclusion of the research question and hypothesis.

2. Study 1

2.1 Method

Before the recruitment of the participants for both phases of the study, approval from the Ethics Committee of the Faculty of Behavioural, Management, and Social Sciences (BMS) with request number 230202 was obtained. This method section was written according to the COREQ checklist (Tong et al., 2007) (see Appendix A).

Research Team & Reflexivity

Personal Characteristics. Four researchers conducted the interviews, consisting of one Dutch female, one German female and two German males. All of them were third year B.Sc. Psychology students from the University of Twente, were they also received training in conducting interviews throughout the study program.

Relationship with Participants. A relationship with the participants had been established by contacting the participants via email and setting an appointment for conducting the interview. However, all researchers interviewed participants who were strangers to them, by recruiting

people they know (mainly friends and family of the researchers themselves) but exchanging them with the other researcher to avoid bias. The participants were told the purpose and goals of the interview study orally before the interview started.

Study design

Theoretical framework. Thematic analysis was used to analyse the data from this part of the study. Themes derived from codes that were created during the analysis provided insight into the participants' experiences and motives for doom scrolling on the topic of climate change, and its potential relationship with depression. An inductive approach had been used while focusing on the semantic meaning of the interview data as there was no existing theory on climate change related doom scrolling.

Participant selection. The participants for the qualitative interview part of the research were recruited through a mixture of snowball and convenience sampling. Snowball sampling is a non-probability sampling method that recruits participants by letting the already recruited participant recruit more participants to also be part of the sample (Nikolopoulou, 2022). Convenience sampling is also a non-probability sampling method where participants are selected by the researchers because this is the easiest way for the researcher to access (Nikolopoulou, 2022). These methods of sampling were chosen because of the time frame of the recruiting period that was limited. Inclusion criteria for the participants to be able to participate were to be between (18 – 45 +) years of age, and speak Dutch or German, as Dutch and German adults were the target population. In total, 15 people from Germany and the Netherlands participated in the interviews (9 males, 6 females), with an age range from 20 to 59 years ($M= 35.6$). Participants with exclusion criteria such as (1) being underaged, (2) currently receiving treatment or medication for a mental disorder, and (3) attempting suicide in the last two year, were screened out before the interviews were conducted. The participants were recruited by letting the researchers and supervisors upload advertisements online on their social media platforms (see Appendix B). As the advertisement was spread on the social media accounts of the researchers and supervisors, most responses were from friends and family. To have the most diverse sample as possible regarding age and sex, researchers decided whom to include in the study.

Setting

Before the interviews, participants were digitally sent an informed consent form. Once filled out, the informed consent forms were sent back to the researcher. After that, a link was sent to the participants to join an online meeting on a digital platform such as Microsoft Teams (version 1.6.00.7354) or Zoom (version 5.13.11). Both the researcher and the

participant joined the meeting from home. During the interview, only the researcher and the participant were present in the online meeting platform.

Data collection

The interview questions were developed by the researchers together and based on the topic of doom scrolling, climate change and every researcher included one or two questions based on their specific research topic (depression, anxiety, helplessness, and social support). These questions were all put together in an interview guide (see Appendix C), which resulted in ten questions in total for a semi-structured interview which allowed some of the questions to have follow-up questions. audio of the interview had been recorded via the recording function on the online meeting platform. At the start of the interview, the participants were told the purpose of the study and what the procedure of the interview would be. After that, the first question was asked following the interview guide. No notes were taken during the interviews as audio was recording for analysis and behaviour was not important in this interview. All interviews were expected to be around 20-30 minutes; however, the longest interview was 44.29 minutes and the shortest 14.47 minutes (M= 24.47 minutes).

Analysis

The form of analysis used in the first phase of this study is thematic analysis. At first, the audio from the interviews were transcribed verbatim by either using a transcribing software or doing it manually by the researchers themselves. Afterwards, the transcriptions were translated from German or Dutch to English. Subsequently, the transcriptions were coded using the programme *Atlas.ti* (version 9.1.3). Inductive approach was used to code the transcripts. This approach aims to develop new concepts based on raw textual data (Chandra & Shang, 2019). To start coding, the researcher began with familiarising themselves with the data gathered from the interviews to be able to already find patterns within the transcripts. These patterns were then coded into themes. The themes and the codes were shared with the other researchers, to define the ultimate series of themes. In total, 13 themes were identified that could be used for developing the survey questions.

2.2 Results

The qualitative part of the study consists of themes that were derived from coding and describe doom scrolling related to climate change. Themes are presented in Table 1 followed by a description of the theme with relevant quotes from the participants during the interview to illustrate. In total, 13 themes were found, all related to doom scrolling. However, 12 were considered relevant with regards to the topic of climate change.

Table 1*Themes, Description, Primary Codes and Frequency of Codes*

Theme	Description	Primary codes included	Frequency of codes
1. Incidental vs actively searched news	Differentiation between incidental exposure to news or actively searching for it	- Interest/ active searching for news	35
2. Detachment	Detachment from the news as a coping mechanism	- Avoidance of news - No interest	65
3. Desensitization	Constant exposure to climate related news lowers the perceived severity	- Not feeling affected by news - Frequent exposure without feeling affected	22
4. Paralysis	The powerless feelings that are experienced results in a state of paralysis which contributes to engaging with less climate change news as it is being perceived as useless	- Negative feelings - Future worries - Feelings of helplessness	87
5. Resentment towards system	Criticism and resentment towards larger overarching structures	- Critique of politics - Critique of society	67
6. Concern for others	The empathic response for those influenced by climate change increases the amount of news consuming	- Future generations - Sympathy towards those in affected areas	46
7. Personal involvement	The personal connection individuals have with others affected by climate change increases the amount of news consuming	- Location	70
8. Media scepticism	The scepticism that is being felt towards to media increased the tendency to check more news in order to check	- Scepticism of media	67
9. Motivation: optimism and pessimism	Optimism and/or pessimism as a motivator to check more climate change related news	- Hope - Anxiety	23

10. Individual responsibility	The moral obligation to stay informed about climate change through media	- Feeling responsible	23
11 Threat	The experienced feelings of climate change as a threat increases the interest to consume more news	- Future related - Negative feelings	34
12. Privilege	The privilege to live in a non-affected area reduces the tendency to consume climate change related news	- Age related - Safe living conditions	40
13. Need to stay informed	The vicious cycle to keep up with the topic of climate change	- Doom scrolling	32

Incidental vs actively searched news

During the interviews, a difference was found in the sensitivity to doom scroll in news that was actively searched by the participants and news that they had been incidentally exposed to by the media platform they were using because of a climate event. This was found more in participants that used social media platform to check the news.

Participant 12: “I don’t look for it or read it more 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. However, I do click on it and read it.”

In this example, the participant shows that when a climate change event or a climate change is being noticed, news about it is also noticed and being read more often. This is considered as frequent exposure to the topic, but does not necessarily lead to doom scrolling, as also mentioned by the participant. However actively searching can lead to doom scrolling.

Participant 12: “I want 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 and feelings about it.”

Here the participant explains that to know if the climate change related situation is ‘really that bad’, more information about it will be looked up, indicating signs of actively searching and therefore might lead to doom scrolling more easily.

Detachment

In order to cope with the effects of climate change and the frequent exposure to it due to the media, detachment was found as a coping mechanism to deal with this persistent

negative news about climate change. Participant 3 mentioned to have stopped with watching the news due to the frequent exposure of its negativity.

Participant 3: “I stopped watching the news somehow. It’s just for these reasons that there are only negative reports, whether it’s change or whatever...”

News is more likely to be avoided in that situation, to be able to cope with the negative feelings that are experienced when being exposed to climate change related news. Therefore, detachment is seen as an indicator for less doom scrolling.

Desensitization

The high amount of news about climate change available was found to also result in decreases of the perceived severity of climate change. Some participants reported that they were less likely to consume climate change news and to doom scroll on this topic as they felt ‘desensitized’ to this topic.

Participant 11: “But also, in the Ahrtal, for example, we notice... um... that was a big ‘hello’ at the beginning, and ‘we have to help’ and ‘the poor people there’ and a year later the topic is actually no longer present. That means that the media are now going back to other things that are more up to date. That means this whole thing... all the media hype about these events, which of course also gets a lot less, very quickly and subsides. And with that, in principle, it becomes again repressed from the, from the daily circle of thoughts ...”

The perceived severity of the climate event in this case is lowered, and so the need to doom scroll on the topic of climate change is lowered as well, as the event is not in the daily thoughts anymore, according to that participant.

Participant 11: “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 mentioned the high amount of climate change related news that is being displayed and therefore the severity of the problem is lowered as, how the participant mentioned it, people become ‘used’ to it.

Paralysis

The uncertainty that climate change may bring concerning the future, individuals feel rendered powerless and paralyzed in their response to deal with it.

Participant 7: “Yes, I do think things like is there any hope for the world? I am not sure if I get these thoughts of the media, but now when I am talking to you

about this topic and think about our world, I strongly get the feeling of is there any hope? I don't really see it positively. And how much it is being mentioned in the media does influence that.”

This participant states its uncertainty and doubt in the future when it comes to how climate change could have an impact on that. Stating the doubt of hope for the future and the negative view towards it indicates some feelings of helplessness. At the end of the quote, the participant adds the influence of the frequent exposure to climate change news on the stated feelings of ‘paralysis’.

Participant 12: I can't really do anything about it makes me feel weird, some kind of helplessness. Maybe also worry but knowing that I can't really change anything would thus make me feel helplessness.

The powerlessness this participant experiences makes the participant almost ‘numb’ in their response to it. Participants that tend to be ‘paralyzed’ in their response to climate change related news tend to be less engaged with it as their action cannot change or influence the situation anyways.

Resentment towards system

During the interviews, a lot of participants mentioned the criticism and resentment that is experienced towards larger, overarching structures and individuals that determine the global or national response to the climate crisis.

Participant 10 mentioned this by saying: “Sick politics is all I can say. And that annoys me”.

Participant 12 mentioned: “... for example if political parties say something about it and I notice in myself that I want to learn as much about it as I can...”.

Participant 10 indicates to have feelings of anger and frustrating when it comes to politics and how they handle the climate change situation, whereas participant 12 clearly states that more media will be consumed as a result of political opinion when it comes to climate change. This shows that the resentment towards the system could result in more self-exposure to media, however, no clear link has been found to doom scrolling.

Concern for others

Participants frequently mentioned an empathic response towards those suffering from immediate consequences of the climate crisis as well as potential victims from future generations. The direct impact it has on people enlarges the willingness to know more about the topic.

Participant 10: “Not in myself. I’m just really a generation that can say wickedly for myself I won’t live to see this. But there are negative thoughts in relation to my daughter”.

This participant explains there is no fear or worry for himself when it comes to dealing with the consequences of climate changes related problems, however, he does experience some worry for his daughter’s future.

Participant 17: “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 having a child or somethings. And then I think okay, oh dear, hopefully they will still have such a nice, carefree life as we are right now”.

This participant shows empathy by fearing for fellow human beings, but also takes in consideration if getting children is the wise thing to do. Concerns are expressed that those children would come into a world that is different from where this participant grew up in.

Personal involvement

Personal connection to a place or having friends and or family living in an area that can be affected due to climate change may serve as an initiator in increase of news consumption which could result in doom scrolling.

Participant 11: “No, 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 do deeper into this whole topic”.

This participant clearly states the importance of the personal connection that must be felt in order to dive deeper into the news topic. Due to the friends this participant has in America, the need to figure out what has happened (climate change related event such as a snowstorm) is being felt and could thus increase the need to doom scroll on this specific topic.

Scepticism towards media

The news on climate change has been described as ‘sensationalist media coverage’ and not giving a complete picture. Some participants perceived the media coverage on climate change as overwhelming, whilst other perceive it as underreported. Evoking scepticism is sometimes the motivation for further research and digging deeper to find more information.

Both participant 12 and 15 mentioned to be ‘sceptic’ about the media and felt the need to look for more to know the truth.

Participant 12: “Probably yes, but that is also because I want to know if it is really that bad, so look for more articles and different sources to see if I can confirm or reject my own thoughts and feelings about it”.

Participant 15: “Generally, when it comes to consuming news, I try to have a broad selection of media to consume and inform myself on various platforms”.

Next to the scepticism that is being experienced when only one source is being consulted, there is also some suspicion of the factual level of news reports being stated by a participant.

Participant 1: “Actually, I'm not sure if everything is 100% correct on the factual level. Now, 90% of all events are somehow caused by climate change, but the other 5% are also quickly consumed and dealt with in my understanding, and I'm not a geologist. But they are quickly dealt with as being caused by climate change, and perhaps not caused by our intervention in nature as humans (...).”

Digging into the topic and looking for more information can be an initiator for an increase in doom scrolling.

Optimism/ Pessimism

Participants reported both optimism and pessimism as a motivation for increased media consumption and signs of doom scrolling. The optimistic feeling that is being felt could increase media consumption.

Participant 8: “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”.

This participant explains that if there would be any projects to counteract climate change, more news would be consumed as a result of it to dig deeper into the topic of climate change. However, pessimistic feelings also could increase media consumption as the negative view on climate change triggers the feeling of looking up and diving deeper into the media.

Participant 12 mentioned “ [...] look for more articles and different sources to see if I can confirm or reject my own thoughts and feelings about it.”

This was mentioned in a more pessimistic tone, as this participant had doubts about the media but used the pessimistic feelings to dive even deeper into the media.

Individual responsibility

Being informed about climate change, and therefore initiating individual climate-aware behaviours, seemed to some participants as some sort of responsibility or moral obligation.

Participant 12 illustrates this by saying: “I have had times that I wanted to change my habits to help improve the earth, so in that sense it did had an effect on my mental state, I had the feeling like I need to do something otherwise I would feel bad. I wanted to be a vegetarian for example [...]”.

Participant 12 explains here that there was a need felt to help improve the earth by sticking to climate aware behaviours, such as becoming a vegetarian. This participant also mentioned “otherwise I would feel bad”, which indicates there is some sort of responsibility or moral obligation being felt.

Participant 10 talks about a Netflix show regarding climate change and felt the need to keep watching, even though it altered the mood of the participant. This ‘need’ of keeping oneself informed about the topic could initiate doom scrolling.

Participant 10: “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”.

People that feel being informed is a moral obligation are usually are in peer groups that discuss climate change on the regular.

Threat

Participants who perceive climate change poses a threat are sometimes inclined to have an increased interest in climate change news to assess the scope of the threat.

Participant 8: “I’m definitely worried [...] Sometimes, if you kind of fall into a hole like that, so to speak, and get more information there, then I think it can cause stress for a short time”.

This participant mentioned that the threat that is being perceived through worry from climate change news triggers the need to seek for more information. The need to look up more information and thus diving deeper into the topic could be an initiator for climate change doom scrolling.

Privilege

Some participants that were not interested to consume climate change news pointed out that they live in a safe area and thus they are not personally affected by the consequences

of climate change, and so have the privilege to not have the need to be concerned with climate change. An example of this is given by participant 11.

Participant 11: “I would feel stress if it happened right at my doorstep and in the immediate proximity. Or if it affects anyone close to me, I would find it stressful [...] But for me personally, I’m not really afraid”.

Here the participant clearly indicates that no fear or stress is being experienced at that moment as the participant does not feel the consequences of climate change directly influence them.

Participant 6 also add so this by stating: “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. Maybe if those big changes would happen here I would be more touched by it [...]”.

No need to inform oneself about the topic is experienced as the severity of the problem is also considered quite low according to the participant. The need to doom scroll will therefore also be less likely.

Need to stay informed

Some participants indicated that news about climate change is motivating them to keep up with the topic even more. They get stuck in a vicious cycle.

Participant 9 mentioned: “Yes... yes, if I hear about it, then of course, or I would like to know more about it. I search again specifically for what I want to find and otherwise I just scroll through or read through what I come across”.

Participant 16 adds to this theme by stating: “So, I notice that I still want to find out more about the whole situation, even if I read it, even if it doesn’t concern Germany [...] it is precisely in these moments in which I read it that actually interest is aroused even more and then there comes... where I read into it and then just want to find out... find out more about the overall circumstances”.

Both participants indicate a need to stay informed about climate change and even want to know more about it. Participant 16 even mentioned that news will still be consumed, even though it does not include anything in their direct environment. These signs are a clear indicator for doom scrolling and getting stuck in the vicious cycle of news consuming.

Development of CCDS

Table 2

Visual Representation of Coding Tree

	Engagement in Climate Change Doom Scrolling	Emotional Responses and Attitudes towards Climate Change
Increase in Doom Scrolling	Media Scepticism Motivation: Optimism and Pessimism Need to Stay Informed Incidental vs Actively Searched News	Threat Concern for Others Personal Involvement Individual Responsibility
Decrease in Doom Scrolling	Detachment Privilege	Desensitization Paralysis

Coding tree. The visual presentation of the themes derived from coding (see Table 2) differentiate between themes that describe engaging in climate change doom scrolling and themes that describe the emotional responses and attitudes towards climate change. There is also a difference shown in which themes showed an increase in the amount of doom scrolling and which themes lowered the chances of getting stuck in the vicious cycle of doom scrolling. The theme ‘Resentment towards System’ is not included in the table, as this theme did not necessarily increase or decrease doom scrolling and no link could be made to the topic of climate change. However, the theme was important to include as many participants mentioned something that was coded into the theme of ‘Resentment towards System’.

Development of Survey Questions. All themes, except ‘resentment towards system’ and ‘optimism and pessimism’ were used to create the questions for the CCDS questionnaire, aiming to create an instrument that measures doom scrolling on the topic of climate change (see Table 3). Question number 3, 4 and 10 are reversed items, which are taken into account when doing the quantitative analysis.

Table 3

Self-Developed Questions for the Climate Change Doom Scrolling Scale (CCDS)

Items	Theme
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1. I am actively searching for news when a climate-change related catastrophe occurs in my proximity.	Incidental and actively searched news
2. I feel the need to avoid climate change news because I feel overwhelmed when reading them.	Detachment
3. The climate change topic is too pervasive; therefore, I pay less attention to it.	Desensitization
4. 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
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. 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

3. Study 2

3.1 Method

This method section was written according to the STROBE checklist (Vandenbroucke et al., 2007) (see Appendix D).

Study design

In study 2, a cross-sectional study design was used. The predictor variable, climate change doom scrolling, was measured with the self-developed questionnaire as a result of the qualitative phase of this study. All four researchers focused on a specific mental health aspect as their dependent variable, where this study focuses on the dependent variable *depression*, with age as an interaction variable.

Participants and recruitment

The inclusion criteria for the participants to be able to participate in the quantitative part of this study were to be 18 years or older and being able to read and understand English as the survey was in English. Participants were excluded from the survey if (1) they were being underaged (< 18), (2) currently received treatment or medication for a mental disorder and (3) attempted suicide in the last two years. The sample consisted of 208 participants. Incomplete responses had to be deleted which resulted in deleting 78 (37,5%) participants from the data set, leaving 130 participants (response rate = 62,5%). Participants had a mean age of 27.68 (SD = 10.42) and an age range of 19 to 62 years old, including 40 males (30.8%) and 89 females (68.5%). Additionally, 81 (63%) indicated being German, 17 participants (13%) being Dutch, and 32 participants had other nationalities (24%). Most participants from the sample had a high school diploma (university of applied sciences) as their highest education level, followed by a bachelor's and master's degree (see Table 4).

Table 4

Demographic Characteristics of the Sample

Demographic	Mean (SD)	Frequency
Age	27.68 (10.42)	130 (100%)
Sex		
Male	-	40 (30.77%)
Female	-	89 (68.46%)
Not specified	-	1 (.77%)
Nationality		
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%)
Highest Education		
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%)

Materials

The quantitative part of this study included six questionnaires. Based on the data and analysis from study 1, the CCDS was developed by the researchers relating to climate change doom scrolling. Dooms scrolling in general was measured using the already existing Doom Scrolling scale (DSS). In addition, already established psychological questionnaire were used, such as the Coping Competence Questionnaire (CCQ), Beck's Depression Inventory (BDI), Brief Form of the Perceived Social Support Questionnaire (F-SozU K-6), and the Hamilton Anxiety Rating Scale (HAM-A). For the purpose of this research only the CCDS, DSS and the BDI were used.

Climate Change Doom scrolling scale (CCDS). The Climate Change Doom scrolling scale has been created by the researchers of this study and is a result of the analysis of the interviews of the first phase of this study, the qualitative part. It includes 15 items, for

example, “Reading negative news on social media is more of a habit now”, that are assessed with a seven-point Likert scale ranging from 1=strongly disagree to 7=strongly agree. Items 3, 4 and 10 were coded reverse. The Cronbach’s alpha coefficient indicates an acceptable reliability ($\alpha = .75$).

Doom Scrolling Scale (DSS). The Doom Scrolling Scale is a relative new scale developed by Sharma et al. (2022), to measure the extent of doom scrolling within an individual. The scale includes 15 items, for example, “I feel an urge to seek bad news on social media, more and more often”, rated with a seven-point Likert scale ranging from 1=strongly disagree to 7=strongly agree. High scores would indicate considerable amounts of doom scrolling. The DSS has an excellent reliability with alpha coefficient of .935 (Satici et al., 2022).

Beck Depression Inventory (BDI). The Beck Depression Inventory is an often-used self-report measure for the measuring of attitudes and symptoms of depression (Beck et al., 1961). It includes 21 items, including a multiple-choice self-report inventory, where high scores indicate elevated levels of depression. The internal consistency for the BDI is exceptionally good with alpha coefficients of .86 and .81 (Beck et al., 1988).

Procedure

A convenience sample was drawn between the 19th of April and the 5th of May 2023 by sharing the link to the survey to friends and family of the researchers and supervisors and by uploading the survey to the Sona System (<https://utwente.sona-systems.com>) of the University of Twente. Students who participated in the survey through Sona System were rewarded with 0.25 credits, by indicating their Sona ID before the start of the survey. A written aim of the study was given to the participants before the start of the survey. Individuals participating in this quantitative phase of the study were asked to fill in a survey online via Qualtrics (www.qualtrics.com). At the beginning of the survey, the participants were first informed about; (1) the aim of the study; (2) the confidentially handling of the data; (3) that the responses will be anonymous; (4) a stable internet connection is needed to fill in the survey; (5) that it would take approximately 20 minutes to complete the survey and (6) that a good command of the English language is necessary to be able to fill in the survey. After reading this information, the participants were asked to give their consent. After the consent had been given, the survey would start.

Analysis

To analyse the data from study 2, the statistical software RStudio (version 1.4.1103) was used. The data downloaded as a CSV file from Qualtrics, and cleaned in R. After that,

descriptive statistics, linear assumptions and correlations were computed before being able to answer the hypothesis.

Hypothesis 1a. To answer the hypothesis 1a [*doom scrolling is positively associated with elevated levels of depression*] a linear regression model (model 1) was developed with the independent variable *doom scrolling* (DSS score) and the dependent variable *depression* (BDI score). This hypothesis can be confirmed if there would be a positive relationship between doom scrolling and depression.

Hypothesis 1b. To answer hypothesis 1b [*climate change doom scrolling is positively associated with elevated levels of depression*], another linear regression model (model 2) was developed with the independent variable *climate change doom scrolling* (CCDS score) and the dependent variable *depression* (BDI score). This hypothesis can be confirmed if there would be a positive relationship between climate change doom scrolling and depression.

Hypothesis 2. To answer hypothesis 2 [*The effect of depression on the elevated levels of doom scrolling in general and doom scrolling on the topic of climate change is more likely in young adults (18-29 years old)*] age has been added to the linear regression model of hypothesis 1 (model 3) and 2 (model 4) as an interaction effect. This hypothesis can be confirmed if the relationship between doom scrolling (in general and on the topic of climate change) and depression is stronger for young adults (18-29 years old) than for other age groups.

3.2 Results

Descriptive Statistics

The mean score from the BDI was 1.41 (SD = .39) and was positively skewed with a skewness score of 1.89. This indicates that there were more participants with lower depression scores and only a few with higher scores. The mean score from the DSS was 2.19 (SD = .99) and also positively skewed with a skewness score of 1.34, also suggesting that most participants reported lower levels of doom scrolling and a few reported higher levels. The mean score of the CCDS was 4.01 (SD = .93) and had a skewness score of -1.04, indicating a negatively skewed distribution, which suggests that more participants reported higher levels of climate change doom scrolling compared to lower levels (see Table 5).

Table 5

Descriptive Statistics

Variable	M	SD
----------	---	----

1. BDI	1.41	.39
2. DS	2.19	.99
3. CCDS	4.01	.93

Note. M = Mean, SD = Standard Deviation

Statistical Power

Linear Assumptions

Before testing the hypothesis, the linear assumptions of the regression models were assessed using residual plots. The residuals from model 1 showed a skewness value of 2.31, for model 2, a skewness score of 2.28 was shown, model 3 had a skewness score of 1.94 and model 4 had a skewness score of 1.88. All of these scores suggest a positively skewed distribution and therefore indicate a violation of the assumption of normality in the residuals. See Appendix (E) for the visual presentation of the histograms.

Correlations

The correlation coefficients indicated that BDI and DSS had a positive and moderate correlation, but not particularly strong ($r = .323$). Additionally, DSS and CCDS also showed a positive correlation ($r = .415$). There was a weak correlation found between BDI and CCDS, with a correlation coefficient close to zero, indicating there is no to little relationship between the variables ($r = .053$) and between age and BDI ($r = -.187$) (see Table 6).

Table 6

Correlations between Variables

	BDI	DSS	CCDS	Age
BDI	-	.323	.053	-.189
DSS	.323	-	.415	-.096
CCDS	.053	.415	-	-.152
Age	-.187	-.096	-.153	-

Linearity

The visual inspection of the scatterplot of the models indicated that a linear relationship was met between DSS and BDI. However, no linear relationship was met between the CCDS and the BDI, DSS and BDI with age as interaction effect and CCDS and BDI with age as interaction effect (see Appendix F)

Homoscedasticity

To assess homoscedasticity, residuals were examined. The scatterplot of the residuals did exhibit patterns, so suggesting heteroscedasticity (see Appendix G)

Independence

To assess the assumption of independence, the Durbin-Watson test was conducted. In model 1, the Durbin-Watson statistic was 1.79, with a p-value of .11. In model 2, similarly, the Durbin-Watson statistic was 1.80 with a p-value of .12. For model 3, the Durbin-Watson statistic was 1.72, with a p-value of .05. Lastly, model 4 showed a Durbin-Watson statistic of 1.73, and a p-value of .06. The p-values associated with the Durbin-Watson test results indicate that there is no significant evidence to suggest autocorrelation in the residuals for any of the four model (all $p > .05$), assuming that the independence assumption holds in the regression analysis conducted.

Hypothesis 1a

The linear regression model to examine the relationship between doom scrolling (DSS score) and elevated levels of depression (BDI score) showed the regression model was statistically significant ($\beta = 0.13$, $SE = 0.034$, $t(128) = 3.861$, $p = <.001$) (see Table 7). The multiple R-squared value was .104, indicating that approximately 10.4% of the variance in elevated levels of depression could be explained by doom scrolling. The adjusted R-squared was .09. Putting it all together, this model yielded a significant effect with indicating that higher levels of doom scrolling are indeed related to elevated levels of depression, and therefore the hypothesis will be accepted.

Table 7

Linear Regression Model with DSS as the independent variable and BDI as the dependent variable

Variable	<i>b</i>	<i>SE</i>	<i>p</i>	95%-CI	
				Lower	Upper
(Intercept)	1.124	.081	< .001***	.966	1.283
DSS	.129	.034	< .001***	.064	.196

Note: b = estimate, SE = standard error

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

Hypothesis 1b

According to the results of the second regression analysis which examined the relationship between climate change doom scrolling (CCDS score) and elevated levels of depression (BDI score) showed that coefficient estimate for CCDS was non-significant ($\beta =$

.02, $SE = .038$, $t(128) = .59$, $p = .55$) (see Table 8). In addition, the multiple R-squared values was very low ($R^2 = .003$, adjusted $R^2 = -.01$), which suggests that climate change doom scrolling explains only a minor amount of variation in depression levels. Therefore, there is insufficient evidence to support the hypothesis that climate change doom scrolling is positively associated with elevated levels of doom scrolling and will be rejected.

Table 8

Linear Regression Model with CCDS as the independent variable and BDI as the dependent variable

Variable	<i>b</i>	<i>SE</i>	<i>p</i>	95%-CI	
				Lower	Upper
(Intercept)	1.319	.155	< .001***	1.013	1.625
CCDS	.023	.038	.55	-.051	.097

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

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

Hypothesis 2

In the next model, which included age as a interaction effect of the first linear regression model, the results revealed that neither DSS ($\beta = .008$, $t(126) = .62$, $p = .53$) nor age ($\beta = -.01$, $t(126) = -.1$, $p = .33$) had a significant direct effect on BDI. Additionally, the interaction effect between DSS and age was also not significant ($\beta = .002$, $SE = .005$, $t(126) = .39$, $p = .7$) (see Table 9). Including age as an interaction effect in the second linear model showed that the interaction effect between CCDS and age was also not statistically significant ($\beta = .01$, $SE = .004$, $t(126) = 1.33$, $p = .18$) (see Table 10). The multiple R-squared value was low ($R^2 = .05$, adjusted $R^2 = .03$), indicating that the model only explains a small portion of variance in depression levels, and therefore, hypothesis 2 is rejected.

Table 9

Linear Regression Model with DSS as the independent variable, BDI as the dependent variable and the interaction effect of Age

Variable	<i>b</i>	<i>SE</i>	<i>p</i>	95%-CI	
				Lower	Upper
(Intercept)	1.397	.272	< .001***	.862	1.932
DSS	.078	.125	.534	-.168	.323
Age	-.009	.009	.333	-.030	.011
DSS * Age	.002	.005	.701	-.007	.010

Note: b = estimate, SE = standard error

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

Table 10

Linear Regression Model with CCDS as the independent variable, DSS as the dependent variable and the interaction effect of Age

Variable	b	SE	p	95%-CI	
				Lower	Upper
(Intercept)	2.190	.510	< .001***	1.191	3.189
CCDS	-.152	.128	.236	-.403	.098
Age	-.029	.017	.089	-.063	.004
CCDS * Age	.006	.004	.185	-.003	.015

Note: b = estimate, SE = standard error

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

4. Discussion

The objective of this study was to find out what effect depression has on the need to doom scroll in general and on the topic of climate change. Thematic analysis was conducted in the qualitative part of study 1. The themes provided insights for the development of the CCDS used in the second part of this study. In study 2, linear regression analyses were performed. A relationship between elevated levels of depression and doom scrolling in general was found, however, no relationship was found between elevated levels of depression and doom scrolling on the topic of climate change. Additionally, age was included as an interaction effect for both types of doom scrolling, with no significant effects.

Depression and General Doom Scrolling

The findings of this study showed a relationship of doom scrolling and elevated levels of depression. This result was expected, as literature research indicated that depression is linked with increased negative beliefs about oneself and the environment, and doom scrolling tends to be a way in which one can conform with these negative beliefs, which results in getting stuck in a vicious cycle (Eysenck & Fajkowska, 2017; Satici et al., 2022). The phenomenon of depression and its effects on seeking for negative news has been researched and supported by literature before. What has been found is that depression could include symptoms of having difficulty with disengaging oneself from negative information, accompanied with self-affirmative tendencies to select what news is consumed and thus

increase the processing of negative news (Gotlib & Joormann, 2010; Knoblock-Westerwick, 2015). This can also be explained through Beck's cognitive triad (Beck, 2008), also known as the negative triad. This negative triad explains that specifically people suffering from depression tend to have negative biases in their thoughts about the world ("everyone is against me because I'm worthless"), oneself ("I'm worthless and inadequate") and the future ("I'll never be good at anything"). Often, the negative triad comes together with distortions in cognitive abilities which could include making overgeneralizations by drawing negative conclusions from negative events, only and selectively focusing on negative aspects instead of positive ones and blaming oneself for the responsibility of these negative events, according to Beck (2008). These dysfunctional cognitive schemata are linked to influence both the selection and interpretation of information, and with repeated activation of these schemata by negative news, individuals with depressive symptoms might use the negative news to seek negative appraisals of information about the world, oneself and the future (Clark & Guyitt, 2016; Beck, 2008). That way of information processing might turn into a routine and eventually lead to an increase in doom scrolling.

Depression and Climate Change Doom Scrolling

Even though a relationship was found between elevated levels of depression and the need to doom scroll, the results indicate that no relationship was found between depression and the need to doom scroll on the specific topic of climate change. Although expected by the literature research conducted the results were not significant. A couple of implications could be the reason for the unexpected outcome. First of all, the participants in the sample used for the survey might have not experienced climate change as severe. This effect was also seen in the interview study, where 'privilege', 'threat' and 'personal involvement' were the main themes that could help to explain this phenomenon. As most of the participants from the sample have a high-school degree or higher, it could be indicated that the social-economic status of the participants is average. There could be chance that climate change is not being perceived as a threat, the participants have the privilege of living in a safe area and thus no personal involvement is being experienced when it comes to climate change related consequences. This is because the people that most likely would be harmed by the consequences of climate change are the people from a low-income, disadvantages countries and communities thus will recognize the consequences of climate change sooner than people from a good social-economic status (World Health Organization, 2021). In addition to that, people often rely on their personal experiences with climate change related events in order to make inferences about the severity and reality of climate change (McDonald et al., 2015), so

having the privilege of being safe could decrease the perceived severity and be an indicator for the insignificant results of the tested relationship.

Another way of explaining why there was no relationship found between depression and the need to doom scroll on the topic of climate change could be that the sample used for the survey might have consisted of individuals who did experience negative emotions towards climate change related media but are motivated to reduce the feelings of discomfort by distancing themselves from it. Additionally, individuals with depressed feelings experience greater negative affect which make them more prone to dissonance effects, as cognitive dissonance can be described as a negative affective response to an aversive event (Stalder & Anderson, 2014). It is plausible that the individuals in the current sample experienced cognitive dissonance towards climate-change related media, and thus having a reduced desire to constantly check the news on the topic of climate change. Negative emotions can occur when we assess events or situations in terms of how they affect our well-being. When individuals assess the potential consequence of climate change, these changes can have an impact on their current state of well-being and lead to experience negative emotions. The cognitive dissonance theory by Festinger (1957) suggests that individuals strive for a consistency between their beliefs, attitudes and behaviours (Festinger, 1957). Individuals tend to avoid situations that could increase their feelings of dissonance by reducing their news consumption to avoid seeing and hearing about climate change. This was effect was also seen during the interviews, resulting in the coded theme ‘detachment’. It is possible that the sample used detached oneself from the climate change related news as a coping mechanism to deal with the possible negative effects this can have for one’s well-being

Influence of Age

Additionally, depressive symptoms might not be experienced a lot among the sample, as a large part of the participants sample used for the survey consisted of people with a German nationality (63%). The mean age of the sample used was 27.68, indicating that a lot of participants were around the young adults age group. By the end of 2021, the prevalence rates for chronic depression in Germany was 16.4% for young adults (18-29 years old) (Mauz et al., 2023). This can also be the indicator that no significant effects were found for age as an initiator for the relationship of elevated levels of depression in both the need to doom scroll more in general and doom scroll on the topic of climate change.

Additionally, given the mean age of the sample, it can be stated that mostly young adults were part of the sample. However, when it comes to the age-related consequences of climate change, older adults are more at risk of heat which can be a consequence of the

climate change and can thus affect their health (US EPA, 2022). The vulnerability of the health of older adults could be an that this age group are most alert to climate change related news, and thus seek out for news more which was also found in a study about the news consumption of Covid-19 (Dong & Yang, 2023). This can be an indicator that in the current study no effect of age was found in the relationship between depression and climate change doom scrolling, as the sample consisted of mainly younger adults. Given the vulnerability of older adults in general, this can not only explain the insignificant results of age on depression and climate change doom scrolling, but also doom scrolling in general.

Limitations

This study has some strengths but also some limitations. To start with the limitations, which the first one would be the collection of the quantitative data through a self-report survey. The responses may be biased and could have been answered with socially desirable answers (Caputo, 2017). This could have resulted in inaccurate filled out surveys, and thus influencing the reliability and validity of the study.

Additionally, some sample size limitations could be noted. A sample size around 200 participants was desired, however, due to the time constraint and after cleaning the data, data from only 130 participants was used. Additionally, the sample size this study had might not count as a general conclusion for the whole population. The survey has mostly been answered by German and Dutch participants, with most of them being women.

Next to that, the participants indicated to be educated, which can be an indicator for the fact that the majority of the participants from the sample have a good social economic status. People from a lower social economic status might influence the results due to their perspective and feelings towards climate change. This is because the people from a low-income, disadvantages countries and communities will be harmed more from the consequences of climate change than people from a good social-economic status as their living environment is usually safer (World Health Organization, 2021).

Next to that, careful conclusions need to be drawn when it comes to the self-developed instrument, the CCDS. First and foremost, additional testing needs to be done to see if the reliability and the validity of this self-developed instrument is good enough. Reliability and validity are both essential aspects when it comes to evaluating a psychological inventory with reducing the concerns about bias and distortion in measurement outcomes (Fitzner, 2007). Reliability was only tested in the sample used for this study and therefore, further steps will need to be taken, such as testing the reliability and validity of this instrument in a larger sample in order the use the CCDS as a reliable and valid measurement instrument.

Additionally, the coding process of the qualitative part of this study was conducted using the thematic analysis framework, resulting in every researcher coding individually and no inter-rater reliability was calculated. Using thematic analysis can include some disadvantages, which could be due the flexibility of this method, as it can be hard for the researchers to decide what to focus on during the coding process. In addition, as no theoretical framework has been used while coding, the analysis could be limited to just describing the themes without deeper insights or meaningful interpretations (Braun & Clarke, 2006). By using an existing theoretical framework, sensemaking of the themes found can be easier, relationship can be understood better and broader conclusions can be drawn (Braun & Clarke, 2006).

Strengths

Continuing with the strengths of this study, first of all, a mixed-method approach was used, which resulted in getting an in-depth exploration of the participants perspectives of the relatively new term ‘doom scrolling’ on the topic of climate change and its mental aspects. Mixed methods allow for a thoroughly exploration and can result in a more complete analysis when it comes to researching relatively new topics (Van Griensven et al., 2014).

Another strength would be that the participants sample for the qualitative part of the study consisted of a relatively even number of males and females, and a great range of age (20-59 years old), which allowed to not only focus on the younger age group, but also take into account the input from the older generation.

And lastly, the topic of climate change doom scrolling was worked on by four researchers in total, however, all of them focusing on a specific mental health aspect. These four papers with each a different focus add up to thoroughly start of the research on this relatively new topic of doom scrolling on the topic of climate change and its effects on mental health.

Recommendations

Future studies could explore the topic of climate change doom scrolling its effects on mental health more thoroughly. To start, recommendations for future research can be given on the sample used for this study. A focus on an even distribution of sexes should be included in future studies where the sample could include more men to draw conclusions for a broader population. The current study had a high number of females in the sample (68.5%). Additionally, the sample of the current study mainly had participants with a European nationality, so including more nationalities outside Europe would create a better picture for a conclusion for the whole population. Considering the possible effects of social-economic

status might have on the perceived severity of climate change, the effect of low-educated and low social-economic status on the need to doom scroll on the topic of climate change and its mental effects can be studied more thoroughly.

Furthermore, due to the time constraint of this paper, thematic analysis and inductive coding were used for the qualitative part of this study. However, another approach, such as grounded theory could give more insights. Furthermore, it is possible for future research to develop a new theory or framework that delves into a greater detail and thus enhances the scientific significance of the results of the study.

5. Conclusion

In the present study a mixed-method approach was used to test the possible relationship of elevated levels of depression on the need to doom scroll in general and on the specific topic of climate change in young adults. What was found is that elevated levels of depression do influence the need to doom scroll more. Depression is an indicator for negative beliefs about oneself, the environment and the future, where doom scrolling tends to be a way in which one can conform with these negative beliefs and feels a need to keep scrolling and looking for more negative news. However, no effect was found in the current study for the relationship between elevated levels of depression and climate change related doom scrolling.

A couple of implications could be the reason for this, given the living conditions of the participants in the sample, the overall good educational level and social-economic status and the mental state of the moment of consuming climate change related news. In addition, age did not influence both relationships, indicating that the effect is not considered stronger for young adults (18-29-year-old). Again, the current sample could be a reason for this effect, given the mean age and nationality of the participants in the sample. Both of the insignificant effects will need to be tested again in future research using a larger sample with an even distribution of sexes, more nationalities and different social-economic statuses.

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Appendix A

COREQ Criteria

Table 2

COREQ Criteria and Corresponding Pages

Criterion	Description	Page
Interviewer/facilitator	Which author/s conducted the interview or focus group?	8
Credentials	What were the researcher's credentials?	8
Occupation	What was their occupation at the time of the study?	8
Gender	Was the researcher male or female?	8
Experience and training	What experience or training did the researcher have?	8
Relationship established	Was a relationship established prior to study commencement?	8
Participant knowledge of the interviewer	What did the participants know about the researcher?	8
Interviewer characteristics	What characteristics were reported about the interviewer/facilitator?	8
Methodological orientation and theory	What methodological orientation was stated to underpin the study?	9
Sampling	How were participants selected?	9
Method of approach	How were participants approached?	9
Sample size	How many participants were in the study?	9
Non-participation	How many people refused to participate or dropped out? Reasons?	N/A
Setting of data collection	Where was the data collected?	9
Presence of non-participants	Was anyone else present besides the participants and researchers?	9
Description of sample	What are the important characteristics of the sample?	9

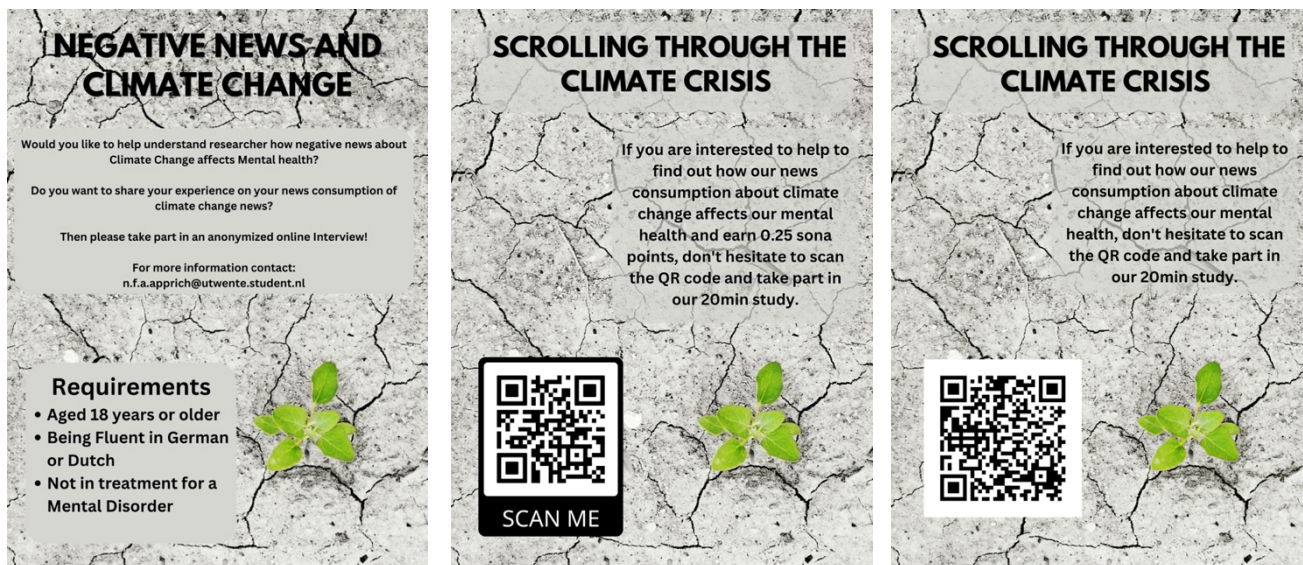
Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	10
Repeat interviews	Were repeat interviews carried out? If yes, how many?	N/A
Audio/visual recording	Did the research use audio or visual recording to collect the data?	10
Field notes	Were field notes made during and/or after the interview or focus group?	10
Duration	What was the duration of the interviews or focus group?	10
Data saturation	Was data saturation discussed?	N/A
Transcripts returned	Were transcripts returned to participants for comment and/or correction?	N/A
Number of data coders	How many data coders coded the data?	10
Description of the coding tree	Did authors provide a description of the coding tree?	19
Derivation of themes	Were themes identified in advance or derived from the data?	10
Software	What software, if applicable, was used to manage the data?	10
Participant checking	Did participants provide feedback on the findings?	N/A
Quotations presented	Were participant quotations presented to illustrate the themes / findings? Was each quotation identified?	10-18
Data and findings consistent	Was there consistency between the data presented and the findings?	10
Clarity of major themes	Were major themes clearly presented in the findings?	9

Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	N/A
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Appendix B

Figure 1

Social Media Campaigns



Note. The first campaign was translated in German and Dutch for the advertisement. The second campaign was for the Sona Pool and the campaign on the right was for the general social media advertisement

Appendix C

Interview guide

Table 1

Interview Guide

Interview Questions

1. What patterns of news checking have you noticed in yourself when reading something negative about climate change?
 - a. 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. What feelings are evoked when you read climate change news online in news media or social media?
 - b. 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. 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. 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. Can you describe your feelings further and explain what causes them in particular?
-

Appendix D

STROBE Criteria

Table 3

STROBE Criteria and Corresponding Pages

Criterion	Description	Page
Study design	Present key elements of study design.	21
Setting	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection.	23
Participants	Give the eligibility criteria, and the sources and methods of selection of participants.	21
Variables	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable.	24
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.	22
Bias	Describe any efforts to address potential sources of bias.	N/A
Study size	Explain how the study size was arrived at.	
Quantitative variables	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why.	24
Statistical methods	a) Describe all statistical methods, including those used to control for confounding.	24
	(b) Describe any methods used to examine subgroups and interactions.	24
	(c) Explain how missing data were addressed.	24
	(d) If applicable, describe analytical methods taking account of sampling strategy.	N/A
	(e) Describe any sensitivity analyses.	N/A

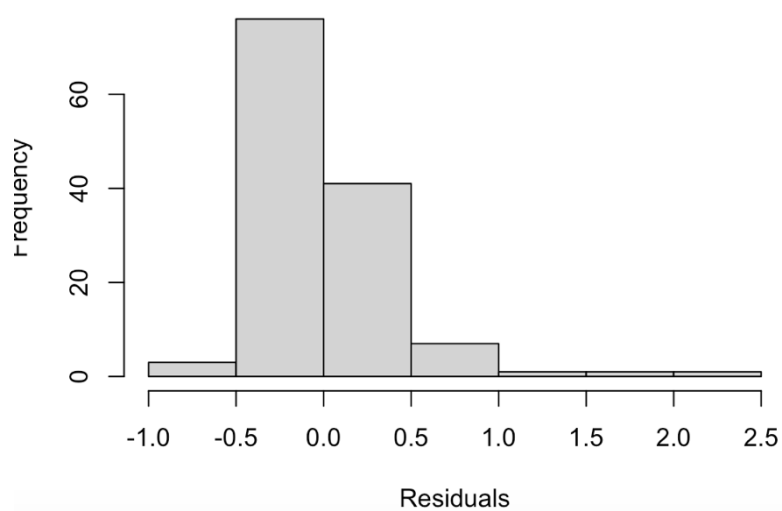
Appendix E

Histograms

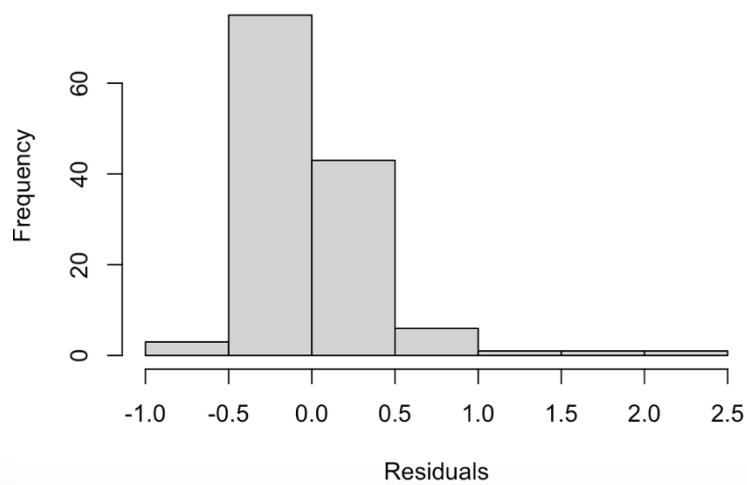
Figure 1

Histograms of the Models

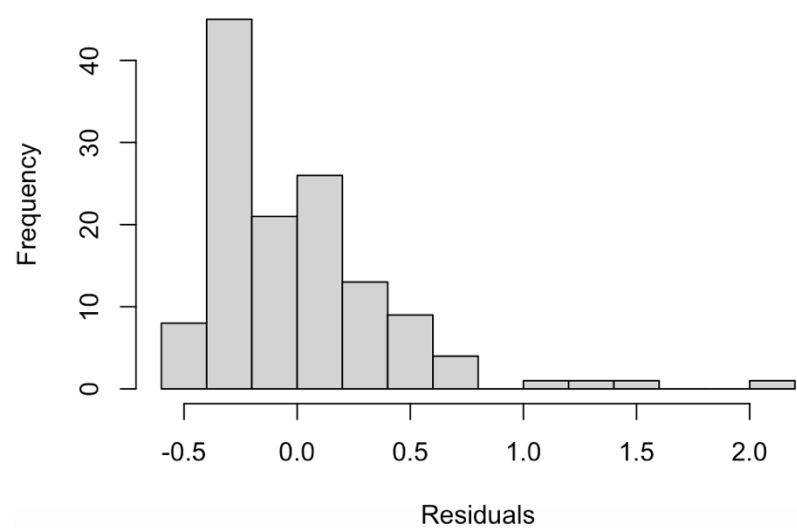
Model 1



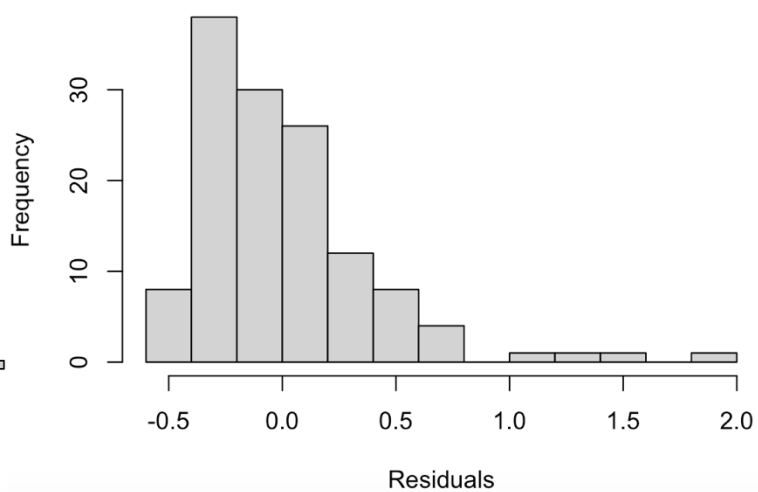
Model 2



Model 3



Model 4

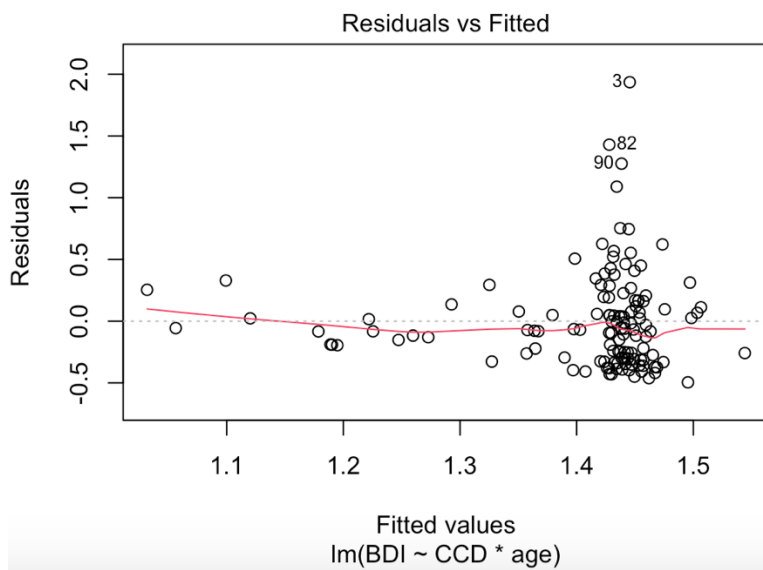
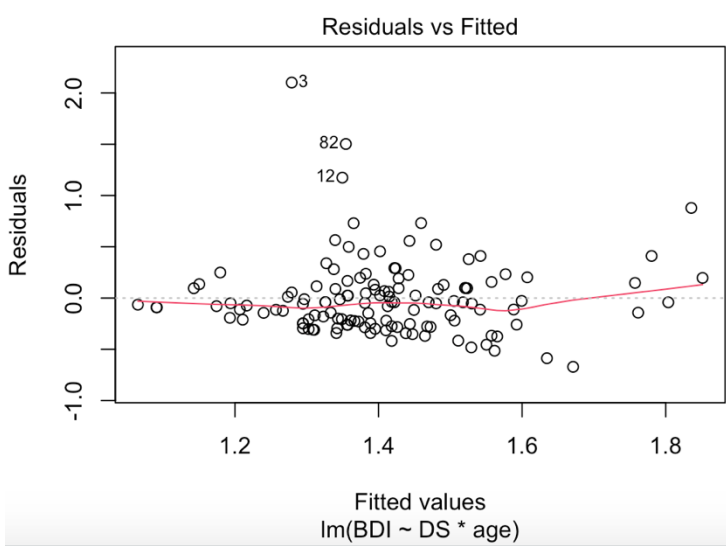
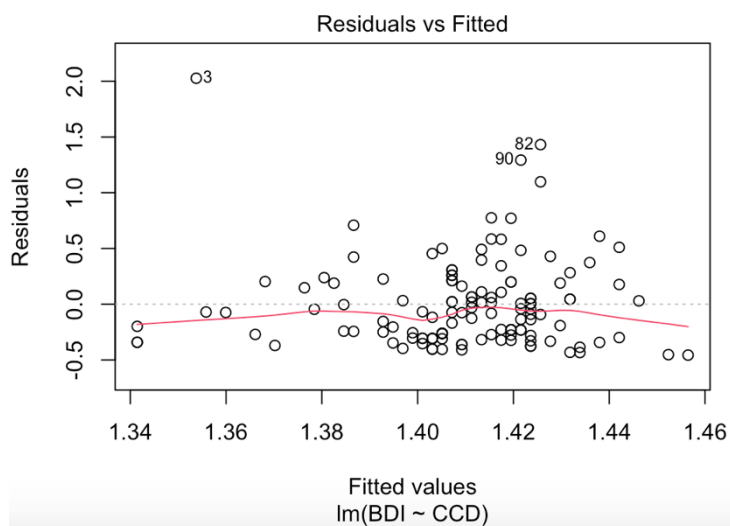
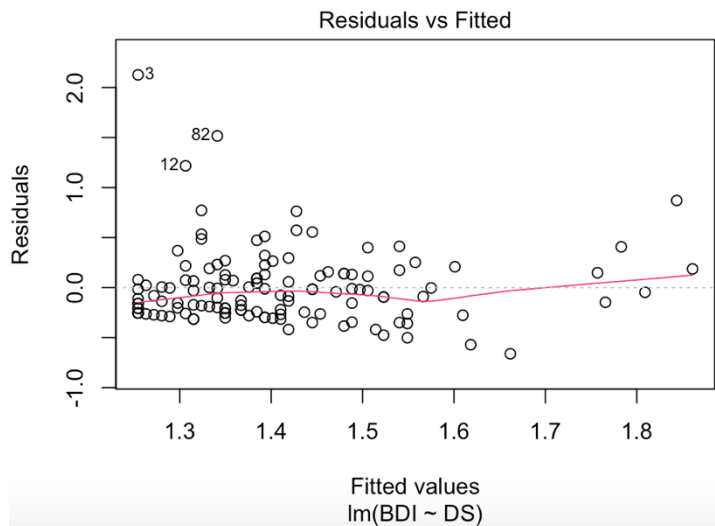


Appendix F

Linearity

Figure 2

Scatterplots of Residuals for Examining Linearity

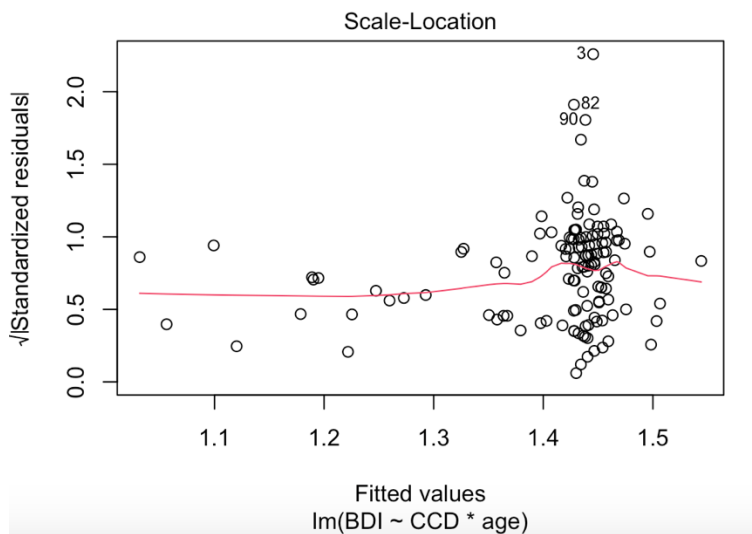
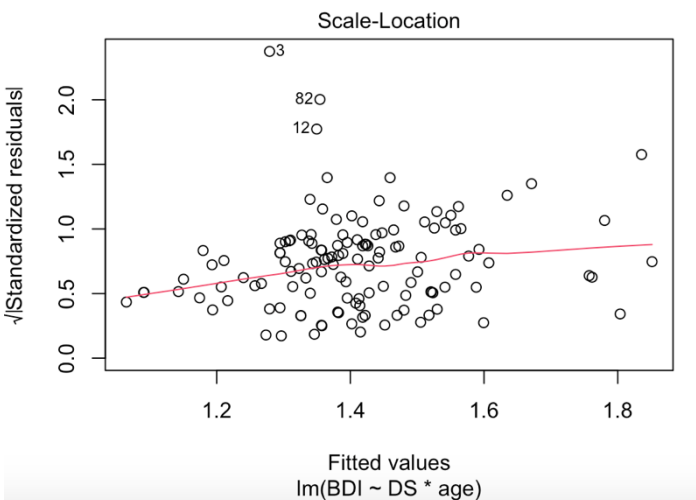
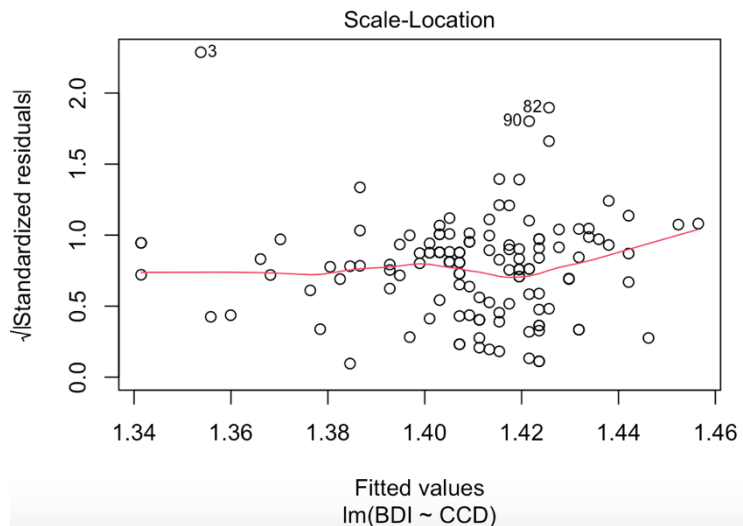
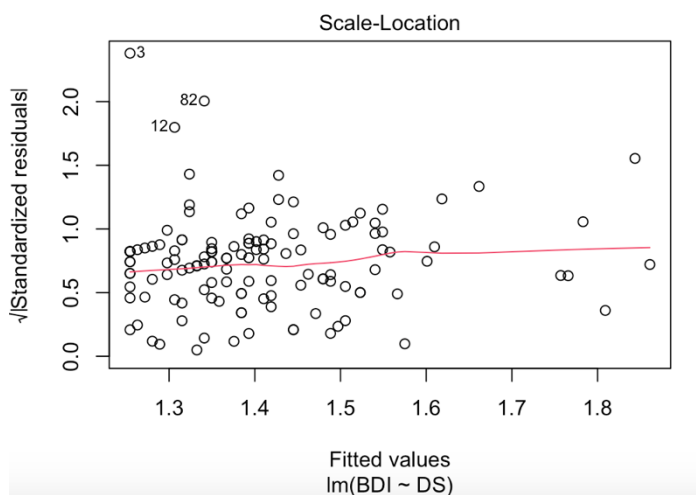


Appendix G

Homoscedasticity

Figure 3

Scatterplots of Residuals to Check for Homoscedasticity



Appendix H

R-Studio Script

```

library(tidyverse)
library(broom)
library(foreign)
library(excludeR)

install.packages("tidyverse")
install.packages("broom")

install.packages("readxl") # Install the package
library(readxl) # Load the package

setwd("Desktop/Analysis")
data <- read_excel("thesis.xls")

#CREATE NEW VARIABLE DS

data$DS <-
(data$DS_Q1+data$DS_Q2+data$DS_Q3+data$DS_Q4+data$DS_Q5+data$DS_Q6+data
$DS_Q7+data$DS_Q8+data$DS_Q9+data$DS_Q10+data$DS_Q11+data$DS_Q12+data$D
S_Q13+data$DS_Q14+data$DS_Q15)/15

#CREATE NEW VARIABLE BDI

data$BDI <-
(data$BDI_1+data$BDI_2+data$BDI_3+data$BDI_4+data$BDI_5+data$BDI_6+data
$BDI_7+data$BDI_8+data$BDI_9+data$BDI_10+data$BDI_11+data$BDI_12+data$B
DI_13+data$BDI_14+data$BDI_15+data$BDI_16+data$BDI_17+data$BDI_18+data$
BDI_19+data$BDI_20+data$BDI_21)/21

#CREATE NEW VARIABLE CCD

data$CCD <-
(data$CCD_Q1+data$CCD_Q2+data$CCD_Q3+data$CCD_Q4+data$CCD_Q5+data$CCD_Q
6+data$CCD_Q7+data$CCD_Q8+data$CCD_Q9+data$CCD_Q10+data$CCD_Q11)/11

#RUN REGRESSION MODEL DS+BDI -> HYPOTHESIS 1

modell <- lm(BDI~DS,data = data)

summary(modell)

#CREATE NEW VARIABLE AGE

data$age <- data$`Q3 Age`

#RUN INTERACTION ANALYSIS -> HYPOTHESIS 2

modell2 <- lm(BDI~DS*age,data = data)

```

```
summary(model2)

#RUN ANALYSIS -> HYPOTHESIS 3
model3 <- lm(BDI~CCD,data = data)
summary(model3)

#RUN INTERACTION ANALYSIS -> HYPOTHESIS 4
model4 <- lm(BDI~CCD*age,data = data)
summary(model4)

#CHECK ASSUMPTIONS VIA PLOTS
plot(model1)
plot(model2)

plot(model3)
plot(model4)

#HOMOSCEDASITY
qqtest(model1)

#CHECK NORMALITY OF RESIDUALS
residualsmodel1 <- residuals(model1)

hist(residualsmodel1)
# Create a histogram with custom names
hist(residualsmodel1, main = "Model 1", xlab = "Residuals", ylab =
"Frequency")

skewness(residualsmodel1)

residualsmodel2 <- residuals(model2)

hist(residualsmodel2)
hist(residualsmodel2, main = "Model 2", xlab = "Residuals", ylab =
"Frequency")

skewness(residualsmodel2)

residualsmodel3 <- residuals(model3)

hist(residualsmodel3)
```

```
hist(residualsmodel3, main = "Model 3", xlab = "Residuals", ylab =
"Frequency")

skewness(residualsmodel3)

residualsmodel4 <- residuals(model4)

hist(residualsmodel4)
hist(residualsmodel4, main = "Model 4", xlab = "Residuals", ylab =
"Frequency")

skewness(residualsmodel4)

#CORRELATIONS

cor.test(data$BDI,data$`Q3 Age`)

cor.test(data$DS,data$`Q3 Age`)

cor.test(data$CCD,data$`Q3 Age`)

cor.test(data$BDI,data$DS)
cor.test(data$BDI,data$CCD)

cor_matrix <- cor(data[, c("BDI", "DS", "CCD", "Q3 Age")])
print(cor_matrix)

#CHECK ASSUMPTION INDEPENDENCE

dwtest(model1)
dwtest(model2)
dwtest(model3)
dwtest(model4)

#DESCRIPTIVE STATISTICS

summary(data$DS)

summary(data$BDI)

summary(data$CCD)

sd(data$DS)

sd(data$BDI)

sd(data$CCD)

skewness(data$BDI, na.rm = TRUE)

skewness(data$DS, na.rm = TRUE)
```

```
skewness(data$CCD, na.rm = TRUE)
```

```
-----
```

```
-----
```