






The influence of climate crisis-related media reporting on the eco-anxiety of individuals

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ABSTRACT

Climate change is a critical issue that strongly affects the mental state of many people and often manifests itself as so-called eco-anxiety. Eco-anxiety is mainly evoked by media reporting, as they are the main source of information about climate change. In this study, the aim was to investigate whether there is a difference in the impact of three different media types (video, radio, and newspaper) on an individual's eco-anxiety level. By conducting a diary study in which participants received climate change-related media input at fixed intervals, the following key findings can be reported: There is a difference between eco-anxiety before and after the media intervention. The video intervention is shown to affect its participants' eco-anxiety. The other media interventions showed no effect. A correlation with neuroticism could be identified, as there is a significant influence on the pre-media intervention level of eco-anxiety and on the overall change in eco-anxiety.

Keywords: eco-anxiety, climate change, media effectiveness, media reporting, neuroticism

INTRODUCTION

Several recent studies have discovered a significant rise in global media attention on climate change at the end of the last decade and demonstrate an actual peak in global media attention to climate change (Kunelius & Roosvall, 2021). This increased attention is mainly caused by currently observable climatic phenomena that concern nature itself (Kunelius & Roosvall, 2021). Additionally, several campaigns, a stronger sense of polarization, and the problems of sustainable, long-term decision-making capacity of political systems have contributed a sense of urgency to the public discourse, a discourse that is regularly addressed in media coverage (Kunelius & Roosvall, 2021).

The general reporting and news coverage that targets climate change predominantly reveals the risks that the population faces with the proceeding change as it is presented as a serious threat to the health, survival, and well-being of individuals (Maran & Begotti, 2021). Such content can evoke a variety of emotional responses, including anger, sadness, despair, and anxiety. Therefore, how the media reports on the issue of climate change, has a decisive influence on the feelings developed by the population towards the topic of climate change (Maran & Begotti, 2021).

Especially the term "anxiety" is frequently used when describing the feelings that are evoked in individuals when they are confronted with the issue of advancing climate change

(Coffey et al., 2021). Anxiety is defined as a feeling of worry, nervousness, or unease about something with an uncertain outcome or a concern to do something or for something to happen (Myles et al., 2020). It is a complex and comprehensive construct that depends on and/or is influenced by many different factors.

One underlying factor that is strongly associated with anxiety is "neuroticism" (Kotov et al., 2010) as many studies show that neuroticism can underlie and positively correlate with anxiety in a variety of evaluative contexts (Schmidt & Riniolo, 1999). Neuroticism is a character trait that can be described as being responsible for feeling emotionally unstable (Eysenck & Prell, 1951). It can also be defined as "the tendency to experience frequent, intense negative emotions associated with a sense of uncontrollability (the perception of inadequate coping) in response to stress" (Barlow et al., 2014, p. 481). As a high neuroticism score is associated with being more vulnerable to dissatisfaction and having difficulties in coping with stress, neurotic individuals exhibit a higher level of several negative symptoms, such as insecurity, emotional instability, nervousness, and anxiety (Paulus et al., 2016).

When people experience stressful situations or crises, they tend to react to these experiences in a way that is consistent with their personality traits (Damti & Hochman, 2022). Based on the previous definition of neuroticism, people high on this trait experience a high level of stress and get upset easily when confronted with a stressful environment (Bellingtier et al., 2021). Consequently, they generally become more alert,

anxious, nervous, depressed, and insecure, and suffer from mood swings (Damti & Hochman, 2022). In contrast, people with a low score on this dimension are more emotionally stable, calm, and confident. This enables them to cope with stress more easily, be sad or depressed less often, not worry as much, and generally be calm (Damti & Hochman, 2022).

Certain stressing situational characteristics, such as uncertainty, unpredictability, and uncontrollability, therefore, seem to be particularly predisposed to evoke emotions of neuroticism and, subsequently, anxiety. As climate change is perceived by individuals as being beyond their influence, it has a high potential to induce these very feelings (Coffey et al., 2021).

The anxiety exhibited by individuals concerning climate change is widely referred to in the literature as “eco-anxiety” (Maran & Begotti, 2021). This term has been operationalized as a broad range of negative emotions related to climate change and environmental threats (Coffey et al., 2021). Ágoston et al. (2022) conducted a study identifying six different components of eco-anxiety focusing on aspects like empathy, fears due to environmental changes, and mental health symptoms. It is one of the most recent studies to examine eco-anxiety from a multidimensional viewpoint (Ágoston et al., 2022).

Common elements of the huge number of different definitions include a description of the challenging emotions due to the awareness of climate change, environmental issues, and threats (Coffey et al., 2021). As stated there, the key factors of uncertainty, unpredictability, and uncontrollability that cause general anxiety also indicate the basic characteristics of eco-anxiety and many studies additionally note that experiences of eco-anxiety may be strongly associated with existential anxiety (Panu, 2020).

Based on the summary of the various current approaches, eco-anxiety can be defined as “anxiety experienced in response to the ecological crisis” (Stanley et al., 2021, p. 1), which seems quite appropriate as it is consistent with many characteristics of the general emotion of anxiety (Coffey et al., 2021).

As demonstrated, eco-anxiety is a complex term and can be perceived and expressed differently depending on individual perceptions of climate change. These perceptions and subsequently the emotions developed by individuals toward the topic of climate change are, as shown above, severely influenced by the chosen style of media reporting (Maran & Begotti, 2021). Therefore, the level of eco-anxiety also seems to be influenceable through the respective selected information medium as well (Maran & Begotti, 2021).

Theoretical Approach of Media Effects and Emotions

For a vast majority of society, climate change and its impact, such as the state of the ozone layer, cannot be yet felt directly—the consequences of the climate crisis can be categorized as invisible risks (Arlt et al., 2010; Kruse, 2007; Schulz, 2003). Consequently, the media plays a major role in defining environmental concerns by communicating them to the public (Arlt et al., 2010; Kruse, 2007). The environmental communication of mass media is evaluated as essential for the transfer of knowledge, values, and attitudes about climate

change, as well as for pointing out possibilities for action (Arlt et al., 2010; Nerb, 2008).

The question arises whether the most widely used media (radio, television, and newspaper) have comparable effects on people consuming them (Teichmann et al., 2022). Research suggests that pictorial or audiovisual representations have greater potential for arousal than verbal representations of the same content. This potential, in turn, can alter the emotional experience and amplify emotional processes (Schramm et al., 2019). Since reading texts requires training and experience, which not all people have to the same extent, visual media are considered easier to process than facts presented only by text. Visual and audiovisual messages tend to be perceived and processed by more people because they are considered entertaining and stimulating (Schulz, 2014). Consumers’ attention and experience are enhanced by audiovisual media since there is no need for consumers to generate pictorial representations by themselves - this requires less effort (Frey, 2017). The visual and auditory channels are considered the most important sensory channels in the processing of information (Lombard & Ditton, 1997; Wirth et al., 2007, as cited in Frey, 2017). Additionally, theories like the Media Richness Theory argue that various types of media differ in their effects and ability to convey messages. Within media richness, aspects like bandwidth, transmission rates, and others lead to certain “richer” media types than others (Dennis & Valacich, 1999). In their study, Otondo et al. (2008) assume that the perceived media richness of video will be higher than audio. Furthermore, audio is assumed to be perceived as richer than text.

Based on the cited research on different sensory perceptions and their role in information processing in the context of media, it was considered worth investigating whether there are differences in the effects of eco-anxiety on consumers when content on the same topic is conveyed through different senses.

The state of current research considered presents ambivalent results on the question of which media type exerts the most influence on consumers of mass media on the topic of climate change. While some studies revealed that media has hardly any effect in terms of opinion and behavior change on climate issues (Peters & Heinrichs, 2005, as cited in Kannengießler, 2020; Taddicken, 2013; Zhao, 2009), other studies perceive media as having a significant effect on opinions and behavior (Arlt et al., 2010; Leiserowitz et al., 2012). Clear differences can be observed between the use of the different media types. A study by Schmidt and Brüggemann (2019) found that public television, private television, and radio are most frequently used to obtain information. Printed newspapers and magazines, as well as online newspapers, also play a major role for respondents (Schmidt & Brüggemann, 2019).

The science investigating the different types of media and their effects on people is also known as reception research. One area of this reception research is media effects research (Gehrau, 2008). Media effects research examines the short- and longer-term consequences that result from the use of media (Vogel, 2007). The research field of media effects research addresses the question of whether people form specific attitudes and a corresponding climate consciousness

as a result of their media exposure and experience (Brüggemann et al., 2018). Within this subfield, a distinction is made between the cognitive media effects, motivational psychological concepts, and emotional or socioemotional impact processes.

In this study, by examining eco-anxiety and investigating its relationship to different media forms, we want to focus on the latter. The emotional impact processes have long gone unnoticed (Vogel, 2007). One difficulty in this area of research is that inconsistent definitions of emotions, such as anxiety, are adopted in the literature (Izard, 2010). A common approach to the definitions is that emotions are episodic, traceable to concrete events, intensity, and of rather a short duration. In emotional impact research, a distinction can be made between a dimensional and an emotion-specific approach. In the emotion-specific approach, discrete emotions such as anger, disgust, or fear are focused on as dependent variables. This approach is the basis for the study presented here (Wirth, 2013). As eco-anxiety was identified as the most relevant emotion connected with climate change, it is examined in this study.

In general, different media channels lead to a variety of emotions on the recipients' side. Mass media are considered the most frequently used source for citizens to obtain relevant information on the climate crisis (Schulz, 2003). In the mass media context, emotions can be triggered by cognitive evaluation processes, vicarious empathy, or by emotional contagion. A difficulty in researching the emotional impact of media is that researchers cannot assume a simple causal relationship. Rather, there is a multitude of intervening variables, such as demographic aspects or the recipient's level of neuroticism (Vogel, 2007).

The sheer use of the different types of media is contrasted with the question of whether these media significantly influence citizens' environmental awareness and related feelings on the climate crisis. Earlier studies show positive relationships between media use and citizens' environmental awareness. In these studies, television consumption was examined as the weakest, and print media as the strongest influencer of subjectively perceived informedness in comparison with each other (Schulz, 2003). Other studies showed no significant relationship between print media, informedness, and linked attitude components, and found television to be the only influencing media type (Sampei & Aoyagi-Usui, 2009; Zhao, 2009). Audiovisual media in particular is capable of conveying not only knowledge and information but also emotional impressions and experiences of different types and intensities (Vogel, 2007). These findings support the assumption that audiovisuals are more supportive of citizens' perceptions of complex issues such as climate change.

The Present Study

Overall, a highly complex as well as difficult relationship between media coverage and its effect on recipients is spoken of (Brüggemann et al., 2018), which we want to address with our research. The research findings to this date resulted in the author's decision to focus on the three media types of television, print media, and radio content. Since earlier research criticized press coverage for predominantly

highlighting pessimistic issues and for its fixation on catastrophes and scandals (Voss, 1995), we chose neutrally worded media reports in all three media forms without dramatic content that could additionally influence consumers. The aim in this respect was to obtain clear results on the differences between the media types from the study. As a media consumption intervention, we present these different media inputs to participants in a multi-day diary study.

The scientific study at hand aims to examine whether and to what extent different types of media and the increased consumption of climate change-related content have an impact on the individual's perceived level of eco-anxiety. As the assumption was made, that the level of eco-anxiety is influenced differently through the respective selected information medium, the following research question arises: How does consumption of climate crisis-related media through various media types influence an individual's eco-anxiety?

Deriving from the theoretical findings provided so far, the study at hand, therefore, aims to examine the following hypotheses:

1. **H1:** There is a difference between the eco-anxiety score for all participants before and after the experiment.
2. **H2:** There is a difference between the different media types as to the effect on eco-anxiety.
3.
 - a. **H3a:** There is a relationship between neuroticism and the level of eco-anxiety in participants pre-intervention.
 - b. **H3b:** There is a relationship between neuroticism scores and intervention effectiveness.

METHODOLOGY

Procedure

Several recruitment strategies were used to gather participants from various backgrounds and demographics. Participants for our sample were recruited primarily via social media. For snowball sampling, the participants were asked to distribute the invitation link to the study at hand. Furthermore, flyers were distributed around Kamp-Lintfort and Kleve, Germany, as promotional material.

The previously mentioned hypotheses were tested over a period of four consecutive days through a diary study. Four interventions were hypothesized to yield an observable effect on participants whilst also rendering itself feasible for participants with possible time constraints. Through that approach, the largest possible sample was aimed to be recruited for the upcoming interventions, which were further supported by incentives being presented to possible subjects. As one of the two incentives incorporated in the study, two subject hours were offered to students of industrial and organizational psychology at the Rhine-Waal University and were additionally communicated in lectures on the campus Kamp-Lintfort. Further, a raffled Amazon voucher of 15€ was advertised as another incentive for all participants who complete the study.

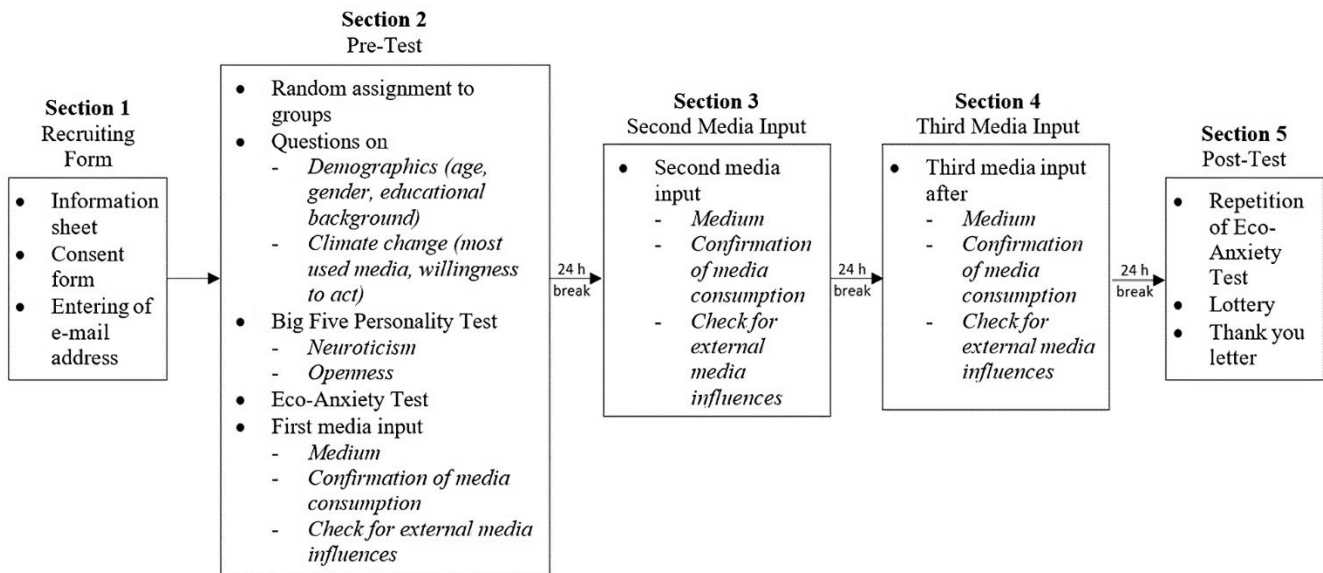


Figure 1. SoSci survey process (Source: Authors' own illustration)

SoSci survey was used to create a multi-day online survey. The survey was accessible to participants from the 22nd of November until the 31st of December. In the first phase of the survey, the participants were provided with a brief description of the study through the information sheet. By ticking a box, participants indicated their understanding of the instructions and agreed to their data being used for scientific purposes. Ultimately, all participants were obliged to enter their e-mail addresses, so that they could be provided with the questionnaire.

The second phase of the study consisted of the pre-test. Here, participants were randomly assigned to one of four media intervention groups. During phase three, each group received one media input every 24 hours over the period of three days in total. When looking at the media intervention groups, all participants received inputs related to the climate crisis topic. The participants assigned to the newspaper group received newspaper inputs while members of the video group received video inputs and subjects who were randomly assigned to the radio group received radio inputs. All groups were provided with media inputs that would take the participants approximately eight minutes to consume. If a subject was randomly assigned to the control group, they received inputs centering around a divergent theme, namely, the relationship between siblings. Appropriate consumption of all media inputs was controlled by having participants answer three control questions regarding each of the inputs.

Phase 5 contained the post-test. The previously mentioned eco-anxiety test was repeated to check for possible changes in anxiety levels after all media interventions. Afterward, participants could give their consent to participate in a raffle for the 15€ amazon voucher. Ultimately, participants were shown a "thank you" note for their effort and participation in the study at hand. **Figure 1** displays the study's process in detail.

Participants

In total, 714 people accessed the recruiting form of the survey through the respective link. 114 participants completed the survey's pre-test. In total, 70 individuals (77% women, 22% men, and 1% diverse) participated in the study at hand, therefore completing all interventions as well as the post-test. The mean (M) age was 24.6 years (standard deviation [SD]=8.215), ranging from 18 to 57 years. Furthermore, 24% of the participants ranked television as their most used media for gathering information.

Based on the diary survey flow (**Figure 2**), the following participant groups could be identified: The control group consisted of 19 participants. Here, the mean age can be reported as 21.8 years (SD=2.92). 11 participants formed the radio group, therefore leading to a mean age of 22.6 years (SD=3.15). The newspaper group included 21 participants with a mean age of 26.6 years (SD=11.5). Finally, 19 participants made up the video group with a mean of 26.7 (SD=9.01). **Figure 2** exemplifies the experimental setup in detail for greater transparency. It chronologically represents the steps taken to complete the study's research goal concisely.

Measures

Eco-anxiety

To measure eco-anxiety, the established and validated German translation of the climate anxiety scale (Clayton & Karazsia, 2020) by Wullenkord et al. (2021) was used. The scale consists of 13 statements of which each is intended to encourage respondents to reflect on their exposure to and cognitive processing of climate change, and then use a 7-point Likert scale ranging from "strongly agree" to "strongly disagree" to give an individual indication of the extent to which the respective statement applies to them.

The internal consistency of the questionnaire with Cronbach's alpha is excellent for both the pre-eco-anxiety test ($\alpha=.981$) and post-eco-anxiety test ($\alpha=.981$).

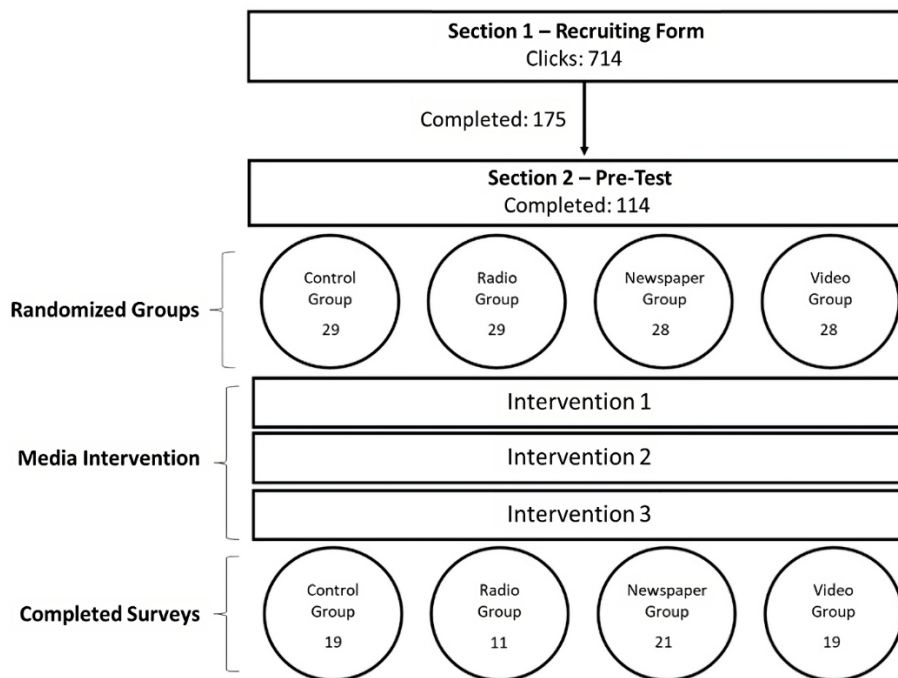


Figure 2. Diary survey flow (Source: Authors' own illustration)

Neuroticism

To test participants' neuroticism levels, the big five personality test (Goldberg, 1981) was utilized. This test describes neuroticism as a central and universal personality trait characterized by sadness and emotional instability. Therefore, individuals who are high in neuroticism tend to experience mood swings, anxiety, and irritability (John & Srivastava, 1999). In the study at hand, only items directly loading on the neuroticism factor were chosen for the participant's investigation (John & Srivastava, 1999). Neuroticism was checked through 12 statements on a 5-point Likert scale with values ranging from 1-5.

For the 12 big five personality test items (John & Srivastava, 1999) used in this questionnaire, the internal consistency for the positive effect of Cronbach's alpha is questionable ($\alpha=.668$).

Analytical Procedure

Participants that only answered some sections of the survey were deleted from the analysis. In two cases of missing values, series mean imputation was used according to standard procedures (Huisman, 2000).

To examine whether there is a difference in pre-eco-anxiety and post-eco-anxiety scores for all participants and a difference between the different media types as to the effect on eco-anxiety, a repeated 4x2 analysis of variance (ANOVA) was conducted. Pre- and post-intervention from the different media types, newspaper, radio, video, and the control group were used as within-subject factors. A post-hoc-test was conducted to check if the effect of differences on eco-anxiety was significantly rooted in the media inputs.

A correlation matrix was performed to predict the levels of eco-anxiety before the intervention through media inputs in connection with neuroticism. Further, a moderation analysis was utilized. Here, the change in participants' eco-anxiety

score from before and after the intervention was defined as the dependent variable while neuroticism was defined as the moderator variable. The media-type interventions coded as a dummy variable, with "0" meaning no intervention and "1" meaning intervention, were classified as the predictor.

RESULTS

Table 1 shows the descriptives.

Eco-Anxiety and Media Consumption

A repeated measures ANOVA was conducted to not only assess if there is a difference in pre-eco-anxiety and post-eco-anxiety for all participants (H1) but also to examine whether there is a difference between the different media types as to the effect of eco-anxiety (H2). Pre-intervention and post-intervention from the different media types, newspaper, radio, video, and the control group were used as within-subject factors.

The change score was analyzed from the repeated measures ANOVA, to identify a difference in eco-anxiety scores for all participants. The ANOVA yielded a significant main effect for the difference of pre-and post-intervention, indicating that the eco-anxiety differed before and after intervening $F(1, 10)=12.52, p=.005, \eta^2=.068$. Turkey's post hoc difference tests for comparisons indicated that participants recorded significantly higher values in eco-anxiety after the intervention ($M=60.3, SD=28.0$) than participants before the intervention ($M=53.1, SD=23.1, p=.005$).

Further results of the repeated measures ANOVA were used to examine whether there is a difference between the different media types as to the effect of eco-anxiety. These results stated that no significant main effect of the three media types on the difference in eco-anxiety was yielded ($F[3, 30]=2.29, p=.099, \eta^2=.052$). Turkey's post hoc difference tests for

Table 1. Descriptives

Maximum	Minimum	SD	Median	Mean	Missing	n	Source
90.0	13.0	29.6	52.0	51.0	49	21	Newspaper pre
91.0	13.0	25.3	65.0	59.9	49	21	Newspaper post
90.5	13.0	24.1	58.5	55.4	49	21	Overall newspaper
68.0	13.0	24.5	37.0	37.0	59	11	Radio pre
82.0	13.0	18.7	62.0	59.3	59	11	Radio post
67.5	13.5	15.5	46.5	48.1	59	11	Overall radio
90.0	13.0	25.3	66.0	56.3	51	19	Video pre
90.0	13.0	21.2	63.0	62.0	51	19	Video post
89.0	19.0	19.7	65.5	59.1	51	19	Overall video
90.0	13.0	28.0	61.0	53.1	0	70	Overall pre-eco
91.0	13.0	23.1	64.5	60.3	0	70	Overall post-eco
86.0	13.0	27.3	74.0	60.7	51	19	Control pre
90.0	13.0	25.7	67.0	59.1	51	19	Control post
88.0	13.0	25.4	72.5	59.9	51	19	Overall control

Table 2. Repeated measure analysis of variance of media effects by eco-anxiety

Source	df	SS	MS	F	p	η^2
Eco-anxiety	1	4,626	4,626	12.52	.005	.068
Residual	10	3,696	370			
Media	3	3,591	1,197	2.29	.010	.052
Residual	30	15,697	523			
Eco-anxiety*media	3	1,390	556	1.43	.259	.020
Residual	30	9,725	389			

Table 3. Correlation of neuroticism & eco-anxiety before intervention

Variable	Eco-anxiety (pre-intervention)	Neuroticism
Between groups	Pearson's r	-
	p-value	-
Total	Pearson's r	.398
	p-value	<.001

comparisons indicated that the mean value of eco-anxiety was significantly different between the newspaper group ($M=55.4$, $SD=24.1$) and the video group ($M=59.1$, $SD=19.7$, $p=.059$). There was no statistically significant difference between participants, with the radio intervention ($M=48.1$, $SD=15.5$) and with the newspaper intervention ($M=55.4$, $SD=24.1$, $p=1.0$). Likewise, no significant differences were found in the comparisons between the control group and the individual media interventions, for example comparing the control group ($M=59.9$, $SD=25.4$) with the newspaper group ($M=55.4$, $SD=24.1$, $p=.892$). Lastly, no significant difference was found in the comparison between the radio group ($M=48.1$, $SD=15.5$) and the video group ($M=59.1$, $SD=19.7$, $p=.151$).

The interaction effect of eco-anxiety and the different media types also did not yield a significant effect $F(3, 30)=1.43$, $p=.259$, $\eta^2=.020$. However, Turkey's post hoc difference tests indicated that participants in the radio group before the intervention ($M=37.0$, $SD=24.5$) and participants after the video intervention ($M=62.0$, $SD=21.2$, $p=.008$) differed significantly. Additionally, the values for the newspaper group before the intervention ($M=51.0$, $SD=25.3$) and after the video intervention ($M=62.0$, $SD=21.2$, $p=.054$) differed significantly. All other pre- and post-intervention combinations showed no significant differences (Table 2).

Neuroticism and Eco-Anxiety

A Pearson correlation coefficient was computed, to assess whether there is a relationship between neuroticism and the level of eco-anxiety in participants pre-intervention (H3a). Neuroticism and eco-anxiety pre-intervention were found to be moderately positively correlated with $r(68)=.40$, $p<.001$. These results can be viewed in Table 3.

To test if there is a relationship between neuroticism scores and intervention effectiveness (H3b), a moderation analysis was performed. The outcome variable for the analysis was the difference between the pre-eco-anxiety and the post-eco-anxiety value. Neuroticism was the moderator variable, and media-type interventions were the predictor variable. The results are displayed in Table 4. A non-significant main effect was found between the three media types, audio, video, and newspaper, and the difference between post- and pre-eco-anxiety, $b=11.57$, $CI(-0.50, 23.64)$, $z=1.88$, $p=.060$. Whereas the main effect of neuroticism on the difference between post- and pre-eco-anxiety attained significance, $b=-1.00$, $CI(-1.85, -.15)$, $z=-2.31$, $p=.021$. Lastly, no significant interaction effect of neuroticism on the three media interventions and their difference between post- and pre-eco-anxiety was found, $b=-1.27$, $CI(-3.23, 0.70)$, $z=-1.27$, $p=.205$.

From these results, it can be concluded that there is no main effect of media interventions on the difference between post- and pre-eco-anxiety. Additionally, there is no statistically significant moderation effect of neuroticism on media interventions and the difference in eco-anxiety. However, a significant main effect of neuroticism was found in this study.

Table 4. Moderation analysis

Predictor	b	SE B	Z	p
Intercept: Media intervention	11.57 [-0.50, 23.64]	6.16	1.88	.060
Neuroticism	-1.00 [-1.85, -0.15]	0.43	-2.31	.021
Media intervention ^x neuroticism	-1.27 [-3.23, 0.70]	1.00	-1.27	.205

DISCUSSION

Summary

The purpose of the presented study was to analyze the influence of climate crisis-related media on an individual's eco-anxiety. In particular, the relationship between climate change media provided via different types of information channels (newspaper, radio, and video), eco-anxiety, and neuroticism was studied. The results of the conducted study correspond to those expected from the research. It appears that there is a difference between the eco-anxiety before and after the intervention, but the media interventions used in this study are not the reason for it. Additionally, a correlation with neuroticism could be identified, as there is a significant influence on the pre-media intervention level of eco-anxiety and on the overall change in eco-anxiety experienced by the participants.

Effects of the Intervention of Media cConsumption

The authors' assumption that there is a difference in pre-eco-anxiety and post-eco-anxiety levels for all participants was supported by the conducted repeated measures ANOVA. Several previous studies have found similar results. For example, Brulle et al. (2012) stated that media information is one of the primary factors influencing the experienced anxiety around climate change in the United States between 2002 and 2010. The studies by Marlon et al. (2019) and Olausson (2011) also supported this hypothesis. In their study, Maran and Begotti (2021) found proof that media exposure is one of the main factors influencing climate anxiety.

Differences in Media Types on Eco-Anxiety

Many studies only focused on the general connection between media and eco-anxiety (Brulle et al., 2012; Marlon et al., 2019; Olausson, 2011) or on one specific media type (Elgaaid-Gambier & Mandler, 2021; Peters, 2021). This study attempts to generate an understanding of whether there are differences between the media types of newspaper, radio, and video as to the effect on eco-anxiety. Based on the calculation of the ANOVA presented, no significant main effect of the media intervention was found, leading to the **H2** being rejected contrary to our expectations based on prior research. However, the media intervention groups showed different levels of eco-anxiety in the pre- post-test. Although there were no significant differences identified by the repeated-measures ANOVA, post-hoc comparison tests showed that the video intervention had a greater effect on participants than radio and newspaper. Comparing the video group with the newspaper group and the video group with the radio group showed significant results. The video intervention group was the only group that showed significant results in the media intervention. This leads to the assumption that videos have the largest effect on eco-anxiety. One possible reason for this

could be aspects of media richness theory, as Otondo et al. (2008) examined in their study. Taken together, the repeated ANOVA showed that there is a difference in eco-anxiety before and after the media intervention, but the media types did not show significant differences overall.

One possible explanation for these results is the selection of media content. The authors tried to ensure a consistent tone in the media content selected. These were intended to have a balanced dramatic aspect but were perhaps not as dramatic as they could have been. With another selection of contents, the results of the media input groups might have been significant. Overall, the participants' eco-anxiety was relatively large at the beginning of the questionnaire, and the scale was not able to capture a higher value for these participant's during a later measurement. Since the assignment of the groups took place randomly at the beginning of the questionnaire independently of the answers given so far, it was not possible to divide the groups equally concerning their eco-anxiety. In future research, a more balanced distribution of participants based on their eco-anxiety should be considered. Another explanation for the findings is that participants are more strongly influenced by the media tools they use most frequently (Kiousis, 2001; Li & Zhong, 2021; Tsftati, 2010). Therefore, one possibility for the future would be to assign experimental groups according to frequently used media. Also, future research can address the reason for the difference between pre-and post-eco-anxiety values, as in this study media inputs could not be identified as a significant reason.

Moderating Role of Neuroticism

The variable neuroticism is used as an independent variable for the moderation effect of media intervention. **H3a** dealt with the relationship between neuroticism and the level of eco-anxiety before the media intervention, stating that there is a relationship between these variables. Previous studies have already examined the relationship between neuroticism and anxiety in general and show a similar relationship as evidenced in this study. Neuroticism relates to a vulnerability to psychiatric disorders, suggesting that there are stable traits underlying the tendency to experience different negative emotions such as anxiety (Gray & McNaughton, 2000). Recent research studies the connection between neuroticism and eco-anxiety (Clayton, 2020). People scoring high in neuroticism did not only show more eco-anxiety but also more pro-environmental behavior than emotionally stable persons (Brick & Lewis, 2016; Hirsh, 2010; Liem & Martin, 2015). The presented results in this study did significantly support **H3a**, stating that there is a moderately positive correlation between neuroticism and the level of eco-anxiety pre-intervention.

The influence of neuroticism scores and media intervention on the eco-anxiety after the intervention was calculated in **H3b** using a moderation analysis. The results showed that the media intervention did not affect the participants' change in eco-anxiety, which fits with the results of **H2**. Furthermore, no significant interaction effect can be found stating that neuroticism does not act as a moderator to the relationship between media intervention and the participants' change in eco-anxiety. This could be due to the habituation effect of using the same eco-anxiety scale in the

first and last part of the questionnaire (Rankin et al., 2009). With this, participants could unconsciously have been anchored to their initial ratings on eco-anxiety. A longer time between testing pre-and post-eco-anxiety could counter this potential bias. However, moderation shows that neuroticism has a significant effect on the participants' change in eco-anxiety, which agrees with **H3a**.

Additionally, the intervention used did not act as such. The results of **H2** showed that there was no difference between the control group without a media intervention and the groups that received one. However, the fact that there is a difference between pre- and post-eco-anxiety (**H1**) scores suggests that many external influences, which could not be captured here, have an impact on the individuals' eco-anxiety. One of these influences could be culture. According to other authors, culture has a significant impact on media preferences and use (Sheldon et al., 2021).

Limitations and Strengths of the Presented Study

As already touched upon, the study is not without limitations. First of all, the sample was not sex-balanced as it was composed primarily of women (n=54). Since women have a higher vulnerability to mental health issues according to studies, consequently anxiety, it is expected that studies with other, more balanced samples, will show different results (Corrarino, 2008; Gifford & Gifford, 2016; Norris et al., 2002; Trumbo et al., 2011). Additionally, the sample showed a rather low mean age (M=24.6). This fact could distort the results, as young people have a larger interest in topics like climate change and are overall expected to be faced with media coverage regarding this topic more often (Frison & Eggermont, 2016; Roberts & David, 2020).

Due to the study design, a high drop-out rate was observed. The first day of the diary study was completed by 114 people; of these, only 70 completed the questionnaire. A lack of interest on the part of the participants, a complicated study procedure, or e-mails informing the participants about the study on individual days ending up in spam folders could be the reasons for this. In future studies, the role of the incentive should be reconsidered and adapted to the effort of the diary study, as this could lower the drop-out-rate and promote the recruitment process.

Socio-demographic variables were partly measured but were not taken into consideration in the analysis. Data such as the family situation or income stability have not been collected and thus were not analyzed in this study. Future research could focus on the differences in eco-anxiety based on these socio-demographic variables. In general, it was found in the evaluation that some questions and variables that were redundant for the analysis of the hypotheses were collected in the questionnaire. For future research, it is recommended to reduce the length of the questionnaire and make it more target-oriented. Limitations of using the diary method, in general, include social-desirability bias, meaning the participants' tendency to provide responses they believe present a favorable image of themselves, which may also have impacted the study's findings (Paulhus & Reid, 1991). Usually, the duration of a diary study varies between 28 days (Radcliffe, 2013), two weeks, one week, or ten working days (Unterhitzberger & Lawrence, 2022). Due to research

economic reasons, we decided to limit period of diary study to three days. Future research should consider a longer and more controlled study design.

Also, possible distractions, and disturbing factors during the processing of the questionnaire could not be surveyed due to the non-controllability of external factors. On the one hand, it was not possible to control whether the participants accessed their media input. On the other hand, although it was asked how much media input the person received through other media, the extent of this could not be precisely recorded. Due to study design, actual clicking and viewing of media input could only be monitored through self-report.

Despite these limitations, there are several strengths in the present study. One strength of the present study is that it extends previous research through the comprehensive assessment of eco-anxiety and media effect research. The study sheds light on the growing issue of eco-anxiety and reinforces the importance of scientific attention to climate change. In this study, an attempt was made to examine the differences in the types of media selected based on the theoretical foundation in terms of their influence on eco-anxiety. This could not be achieved due to the limitations mentioned in the text but offers potential for future research.

CONCLUSION

Climate change and its consequences on the environment and the human psyche accompany our everyday life more than ever. Through media coverage, the effects of climate change become apparent to us and influence an individual's eco-anxiety. The present study shows that neuroticism plays a significant role in this context. The study was able to identify a difference between pre-and post-eco-anxiety. This difference cannot be explained by the media interventions used. However, neuroticism was identified as a moderating variable for both the pre-and post-eco-anxiety values.

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Ethical statement: Authors stated that in the preparation, execution, follow-up and analysis of the study, all authors involved, and the supervising teacher constantly ensured that ethical standards were adhered to. The study was made available to participants from a legal age, who all gave written informed consent to participate in the study. Authors further stated that data collected during the study were stored on secure servers on the SoSciSurvey question platform and were only accessible to the research team for data analysis. The response data is transmitted to the platform in encrypted form. No IP addresses were recorded, and the email addresses collected for sending the questionnaires were stored independently of the data set. The collected data was deleted after evaluation of the study. Due to the scope of the study and the available resources in terms of both time and finances, no external ethics committee was commissioned with the supervision of the paper.

Declaration of interest: No conflict of interest is declared by authors.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

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