Summer 6-15-2023

Inoculation for Neutralizing Misinformation: Replication of an Experiment on the Effect of the Fake Experts' Strategy in Climate Change Communication's Context

Joseph Abdalla
joseph.abdalla@aucegypt.edu

Graduate Studies

Inoculation for neutralizing misinformation: Replication of an experiment on the effect of the fake experts' strategy in climate change communication's context

A THESIS SUBMITTED BY

Joseph Abdalla

TO THE

Faculty of the School of Sciences and Engineering

11 May 2023

in partial fulfillment of the requirements for the degree of
Master of Global Public Health

Declaration of Authorship

I, Joseph Abdalla, declare that this thesis titled, "Inoculation for neutralizing misinformation: Replication of an experiment on the effect of the fake experts' strategy in climate change communication's context" and the work presented in it are my own. I confirm that:

- This work was done wholly or mainly while in candidature for a research degree at this University.
- Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated.
- Where I have consulted the published work of others, this is always clearly attributed.
- Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work.
- I have acknowledged all main sources of help.
- Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself.

Signed: J. Abdalla

Date: 11 May 2023

Abstract

Low acceptance of climate change as well as the low support for its mitigation efforts can be due to a public misconception towards climate change. Climate skeptics use a communication strategy of fake experts to spread misinformation through spokespersons who are not experts in the field. Inoculation can be a protective approach for tackling the misinformation's effect. Previous research was conducted in the United States and Germany and was never conducted in Africa. This study aimed to complement the previous research findings with results for Egypt by replication an experiment by Cook et al. with a 2 × 2 between-subjects design. A total of 300 participants were recruited into the study and they were randomized into four stimuli groups (control, misinformation-only stimulus, inoculation-only stimulus, and inoculation stimulus followed by misinformation stimulus). A total of 274 eligible participants' data was analyzed. The study explored climate change misinformation's impact on the participants and tested an inoculation stimulus that could protect against misinformation pre-emptively. The effect of the difference in the participants' demographics and the interactions with the study stimuli were also analyzed. The difference in the study stimuli had a significant effect on the participants for the perceived scientific consensus where the misinformation stimulus had a significant negative effect while the inoculation-only stimulus significantly neutralized the misinformation's effect. The inoculation-only stimulus also significantly neutralized the misinformation's effect on the scientific consensus influence. The study also found that the differences in the sex, age, education level, and educational background of the participants had significant effects and significant interactions with the study's stimuli on the study's dependent variables.

Acknowledgments

I would like to thank all the AUC community members who participated as research subjects in this study.

Contents

List of Figures

List of Abbreviations

SD	**Standard deviation**

List of Symbols

Cronbach's a	*Cronbach's Alpha*

Chapter 1

Introduction

Significant societal consequences can happen because of people's acceptance of misinformation as being correct (Chigwedere et al., 2008). It has been observed that the vaccination intent against the coronavirus disease 2019 (COVID-19) was reduced in both the USA and the UK because of scientific-sounding misinformation about COVID-19 (Loomba et al., 2021). The study of how false information spreads through populations is called infodemiology which is the science of infodemics (Calleja et al., 2021; Ecker et al., 2022). The World Health Organization, in 2020, has given the label of serious public hazard to infodemics. During a disease outbreak, the spread of misinformation can result in higher-risk behaviors and cause confusion. The spread of misinformation can lead to undermining the public health response and reducing the trust in health authorities. When people are not sure how to protect their health and the health of those around them due to an infodemic, this can result in lengthening and intensifying outbreaks (WHO, 2020).

Due to the huge amount of information that individuals are being confronted with daily, it is not possible for people to make an assessment of each piece of information they receive on its merit. People rely more on heuristics to evaluate information and arguments (Richter et al., 2009). However, this method is susceptible to bias. People are inclined to favor information that resonates with their existing beliefs rather than dealing with information in an objective and neutral manner (Johnson et al., 2009). When an individual is very certain regarding an issue's misbeliefs and is perceiving it as important or has an intense attitude toward it, it becomes very hard to correct such misconceptions (Johnson et al., 2005). Therefore, weakening misinformation and countering it is needed as an alternative means to protect people against misbelief formation. Informing people beforehand about the misinformation techniques, known as the inoculation theory, has been shown to make people less prone to misinformation by being inoculated against the false information's argumentative effects (Banas & Rains, 2010). Also, susceptibility to believing misinformation is linked with despair while hope makes individuals less prone to

rumors or false ideas. (Graham, 2022)

Several studies have shown that there is almost a full agreement between climate scientists that climate change is anthropogenic (Anderegg et al., 2010; Cook et al., 2016; Doran & Zimmerman, 2009). However, although there is a consensus among 97% of publishing climate scientists that humans have caused global warming, the public perception is much lower at around 57-67% (S. L. van der Linden et al., 2015). The public perceived consensus was shown to be a gateway belief that has an influence on actions related to climate change and the support of its relevant policies. This makes the gap between the 97% scientific agreement and the public perception to be of significance (Aklin & Urpelainen, 2014; Ding et al., 2011; Lewandowsky et al., 2013; S. L. van der Linden et al., 2015).

An underlying reason for this reduced public perception of the consensus is due to the spread of misinformation by fake experts with the intent of reducing public support for binding climate regulations and policies (Cook, 2016; Diethelm & McKee, 2008). The scientific consensus message to the public could be undermined by the spread of misinformation (Koehler, 2016; S. van der Linden et al., 2017). Any information that is counterfactual or not correct, either spread intentionally or non-intentionally, constitutes the broad term of misinformation (or disinformation) (Scheufele & Krause, 2019). One of the cognitive biases identified by Zhao and Luo (2021) was the not true sense that concerns the thought of underestimating the impact of individual actions on a large issue. This false sense was referred to as "Pseudoinefficacy" which is caused by negative affect that can be debiased by inoculation to protect individuals against misinformation. (Zhao & Luo, 2021)

Raising doubts by fake experts on the consensus lowers the public perception as well as the public acceptance of global warming (S. van der Linden et al., 2017). Although the fake experts lack any relevant scientific experience, they convey the impression of possessing this experience (Cook et al., 2017). The "fake expert" technique is used for spreading misinformation depending on the fact that the perception of the recipient towards a communicator's trustworthiness and expertise determines his/her credibility (Stiff, 1994). Most scientific topics are complicated which makes the task of identifying if a scientific expert is trustworthy to be not possible for the audiences (Cook et al., 2017; S. van der Linden et al., 2017). The 1995 Leipzig Declaration is an example of this fake expert technique. This declaration is a document intended to refute the climate change scientific consensus which many of those who signed it were not working in the climate science

field (Jensen, 1998).

The way information or misinformation is interpreted by people is affected by their own worldviews and beliefs. Misinformation regarding climate change can be effective when it resonates with people's current beliefs (Schmid-Petri & Bürger, 2022). Protection against misinformation can be achieved through inoculating people by informing them about the techniques used for spreading misinformation prior to exposure. McGuire and colleagues were the first to formulate the inoculation theory with the goal to protect people against misinformation (Compton, 2012; McGuire & Papageorgis, 1961). The inoculation against misinformation can be achieved by exposing people to a refuted version of the false information message prior to their actual exposure (McGuire & Papageorgis, 1961). The inoculation messages, which act like vaccines that induce antibodies' production for future exposure to viruses, can protect against future misinformation by providing counterarguments prior to exposure (Cook et al., 2017).

Recognizing misinformation is easier when there is an understanding beforehand of the logical fallacies and underlying mechanisms used by skeptics in their arguments (Banas & Rains, 2010; Bolsen & Druckman, 2015). Inoculation has two elements: The first, which is an affective element, is an explicit warning of an impending threat (for example, a warning that there are arguments casting doubts on climate change's scientific consensus). The second, which is a cognitive element, is a pre-emptive refutation of the argumentative techniques used that expose the logical fallacies (for example, the explanation of the rhetorical use of fake experts in large numbers to provide legitimacy for a skeptical argument). When the fallacy is exposed, the misinformation message is received in a weakened version. Therefore, when people get exposed to a false argument, they would be able to dismiss the misinformation by the counterargument provided by the inoculation. Resisting misinformation using inoculation messages is more effective than using supportive messages which only provide correct information but do not point out the misinformation (Banas & Rains, 2010).

Inoculation messages were found to be effective in protecting against arguments from soda companies that are pro-sugar (Niederdeppe et al., 2014), starting to smoke due to the threat of peer pressure (Pfau et al., 1992), and arguments that justified alcohol consumption (Duryea, 1983). Inoculation has been observed to provide protection against misinformation about agricultural biotechnology (Wood, 2007). Also, inoculation messages can increase the level of skepticism

toward conspiracy theories (Banas & Miller, 2013). Inoculation was found to influence people who have preexisting attitudes which is a relevant situation to the issue of climate change (Wood, 2007).

Inoculation's effects have been tested experimentally in the context of climate change. Exposing participants to both the consensus information and misinformation did not result in a significant change in climate change acceptance (S. van der Linden et al., 2017). This shows that the information's positive effect on people can be undermined by misinformation without inoculation. When coupling the consensus information with the inoculation and its technique's explanation, the level of acceptance of anthropogenic global warming increased significantly. The effect of inoculation has been studied by Cook et al (2017). In their second experiment, they examined inoculation against arguments that cast doubts in an explicit way on the scientific consensus by using the strategy of the "fake experts". They found that the consensus information can neutralize misinformation's effect and can also increase the perception of the consensus. A polarizing effect, due to misinformation on the scientific consensus, regarding behaviors toward climate change has been observed. It was also observed that the inoculating message has the potential to neutralize the misinformation effect (Cook et al., 2017).

Providing protection against misinformation could be done online as well through inoculation campaigns on social media. (Roozenbeek et al., 2022) In turn, one of the approaches of applied cognitive immunology is practicing critical thinking for online communications in the digital age. (CIRCE, 2021) Inoculation against misinformation has a challenge too because of the vast amount of pieces of misinformation, it is not possible to inoculate against each false claim which means that the issue with inoculation is its scalability. (Traberg et al., 2022)

Previously conducted research on the effect of inoculation against the misinformation related to climate change focused on participants from the United States and Germany (Cook et al., 2017; Schmid-Petri & Bürger, 2022; S. van der Linden et al., 2017). In this research, the effect of inoculation against misinformation about climate change was examined in Egypt on Egyptian participants. Conducting this research in an African country was an extension of the previous research conducted to observe the effect of inoculation against misinformation regarding climate change in a continent that contributes to less than 3% of the global greenhouse gases emission whereas the United States alone contributes to 20% (UNDP 2007). It is also not clear which effect misinformation has in contexts in which there is less lobbying effect against climate change (in

Egypt compared to the US setting).

The results of climate change imposed a high risk for Africa in terms of a decrease in the production of food as well as the productivity of labor in addition to droughts, floods, and heatwaves. (Atwoli et al., 2022) One of the top five countries to be highly affected by the sea level rise by one meter due to climate change is Egypt. (Batisha, 2012) The Nile Delta, in addition to other coastal areas, in Egypt could be impacted by the sea rise level because of global warming. (Lotfy, 2014) Due to climate change, the sea level rise of the Mediterranean Sea by 2050 is expected to be one meter which would result in the Nile Delta losing a third of its land. This event would result in displacing about 10 to 15 million residents of the Nile Delta. (Hassanin, 2010) This is crucial to Egypt as more than half of its agricultural land is in the Nile Delta, its most populated area. (Abutaleb et al., 2018)

The research questions of this study were: First, what effect does misinformation have on the perception of the scientific consensus on climate change and climate-related attitudes? Second, can inoculation have a neutralizing effect on the influence of misinformation?

Additionally, policy recommendations will be developed, based on the study's results, for enhancing the used techniques for protecting the public against misinformation regarding climate change.

Chapter 2

Methodology

The study design that was followed for this experiment was a 2 x 2 between-subjects, which fully crossed an inoculation stimulus and a misinformation stimulus, resulting in four different condition groups: a control group (no stimulus), an inoculation group (one stimulus, without misinformation), a misinformation group (one stimulus, without inoculation), and an inoculation followed by misinformation group (two stimuli, both inoculation, and misinformation).

The target sample size for this experiment was 300 participants as a convenient sample from the community of the American University in Cairo. The participants were recruited from various locations on campus and during different times of the academic working days. Participants consented verbally and then were randomized into the study's four groups (control, inoculation, misinformation, and inoculation followed by misinformation).

The participants were asked to pick enclosed cards randomly (each participant picked one card) which had numbers to assign them to their respective study stimulus group without knowing which stimulus group they are going to be exposed to avoid bias. After reading the study stimulus, the participants were asked to fill out the post-exposure survey. Two attention-filtering questions were required to be answered by participants after they were exposed to the stimuli to assess their response quality for inclusion in the analysis of the results. Also, a question about whether the participant is Egyptian or not was included. Only Egyptian participants will be included in the analysis of the results. The inoculation and the misinformation stimuli used for this experiment followed those used in the second experiment by Cook et al. (2017).

The misinformation stimulus used was the Oregon Petition which was a climate change skeptics' initiative (The Oregon Global Warming Petition Project, 2007) (Appendix B). Van der Linden compared six opposing claims on climate change and the Oregon Petition had the highest negative effect on the participants' climate change acceptance (S. van der Linden et al., 2017). The misinformation stimulus was a statement that 31,487 scientists signed a document that claims that climate change is not a result of greenhouse gases emission by humans and therefore denies having a scientific consensus on climate change. This was a fake experts' technique as most (over

99%) of those who signed this petition did not have any experience in climate science (Cook et al., 2017).

Additionally, another piece of misinformation stimulus about climate change was added. A document titled "World Climate Declaration" that denies climate change, claiming that there is no climate emergency was published by the Climate Intelligence Foundation on 27 June 2022 (Appendix B). The document is stated to have been signed by 1,107 scientists and professionals (CLINTEL, 2022). According to investigations, none who signed the "World Climate Declaration" were experts in the climate science field. Also, one of the leading two people for this document was a retired geophysicist who was an ex-employee for an oil giant company while the other leading person was a journalist. The percentage of those who signed the document and were described as climate science experts was only 1% out of the total 1,107 signatories. (Euronews 2022)

The inoculation stimulus utilized the "fake expert" technique which delivered misinformation in a way that falsely claimed expertise and was used for denying scientific consensus. The inoculation stimulus was an advertisement for consuming tobacco which stated that 20,679 physicians recommended a certain brand of tobacco products (Gardner & Brandt, 2006) (Appendix A). This stimulus aimed to inoculate against the way of presenting huge numbers of fake experts by the Oregon Petition without directly referring to the petition. A debriefing text was shown to those participants who were exposed to the misinformation stimulus after filling out the survey (Appendix D).

Seven dependent variables were assessed post-exposure: (1) trust in climate scientists, (2) acceptance of anthropogenic global warming, (3) the perceived scientific consensus, (4) the perceived human influence on global warming, (5) the support for climate mitigation and adaptation efforts done by the government will be assessed as well, (6) the climate change importance, and (7) the scientific consensus influence (Appendix C).

For the "Trust in Climate Scientists" dependent variable, the participants rated five items with each item on a Likert-type scale (ranging from 1 = totally disagree to 5 = fully agree) to measure their trust in climate science. For the "Acceptance of Anthropogenic Global Warming" dependent variable, the participants rated five items with each item on a Likert-type scale (ranging from 1 = totally disagree to 5 = fully agree) to measure their acceptance of climate change as human-caused. The "Perceived Scientific Consensus" dependent variable measured the participants'

perception of the climate change consensus among scientists. The participants chose one answer option from an 8-point scale reflecting ranges (example: between 70% to 90%) as categorical answer options. The midpoint of each range was used for the analysis of the results. For the "Perceived Human Influence" dependent variable, the participants rated five items with each item on a Likert-type scale (ranging from 1 = totally disagree to 5 = fully agree) to their perception of the level of impact of the carbon dioxide emitting human activities on climate change. For the "Support for Climate Mitigation and Adaptation Efforts" dependent variable, the participants rated eight items with each item on a Likert-type scale (ranging from 1 = totally disagree to 5 = fully agree) to measure their support for governmental projects which aim to mitigate the effect of climate change. For the "Climate Change Importance" dependent variable, the participants answered two questions to measure their interest/concern for climate change. For the "Scientific Consensus Influence" dependent variable, the participants answered five questions to measure their views about how influential scientific consensus is. Additionally, the sum of the means of the seven dependent variables was calculated per participant to have it as an overall score which will be referred to in the results and discussion as the "Overall".

The study data was entered by filling out an electronic version of the study's survey by the participants using an electronic device that was provided to them for the purpose of the study. The data analyses were performed using IBM SPSS Statistics (Version 29).

This research study was approved by the Institutional Review Board of the American University in Cairo (AUC), Case# 2022-2023-118.

Chapter 3

Results

A total of 300 subjects were recruited for the study. They were randomized equally into the study's four groups (control, misinformation, inoculation, and inoculation + misinformation) with each group having 75 subjects. Only Egyptian participants were included in the analysis, so 22 subjects were excluded for being non-Egyptian. Also, another four subjects were excluded for not being able to answer the attention-filter questions correctly. Therefore, a total of 274 participants were eligible to be included in the study's data analysis for testing the difference between the study's four groups: control (n = 69), misinformation-only (n = 70), inoculation-only (n = 66), and inoculation + misinformation (n = 69). Participants (N = 274) were 51.8% females. Figure 1a shows the distribution of the participants according to their sex.

For the age groups of the participants, 250 participants (91.2%) reported their ages between 18 to 29 years old, 20 participants reported their ages between 30 to 44 years old, and only four participants reported their ages between 45 to 59 years old. For the analyses conducted to compare the difference between the age groups of the participants and the study's stimuli, the two age groups "30 to 44 years" and "45 to 59 years" were merged into "30 to 59 years" as the participants who belonged to the age group "45 to 59 years" were very few (1.5%). Figure 1b shows the distribution of the participants according to their age groups.

For the analyses conducted to compare the difference between the education levels of the participants and the study's stimuli, the bachelor's degree holders (n = 130), the master's degree holders (n = 29), and Ph.D. degree holders (n = 6) were merged into one education level group (Bachelor's, Master's, and Ph.D.). This was done to allow for comparison between the undergraduate (high school diploma) participants (39.8%) and those who have higher academic degrees. Figure 1c shows the distribution of the participants

according to their education levels.

For the analyses conducted to compare the educational backgrounds of the participants and the study's stimuli, the participants who belonged to the Life Sciences background (n = 29) and those who belonged to the Engineering/ Architecture background (n = 110) were merged into "Science and Technology" background (50.7%). This was done to allow for comparison between those who have scientific backgrounds (Science and Technology background) and those who have non-scientific backgrounds (Social Sciences background). Figure 1d shows the distribution of the participants according to their educational backgrounds.

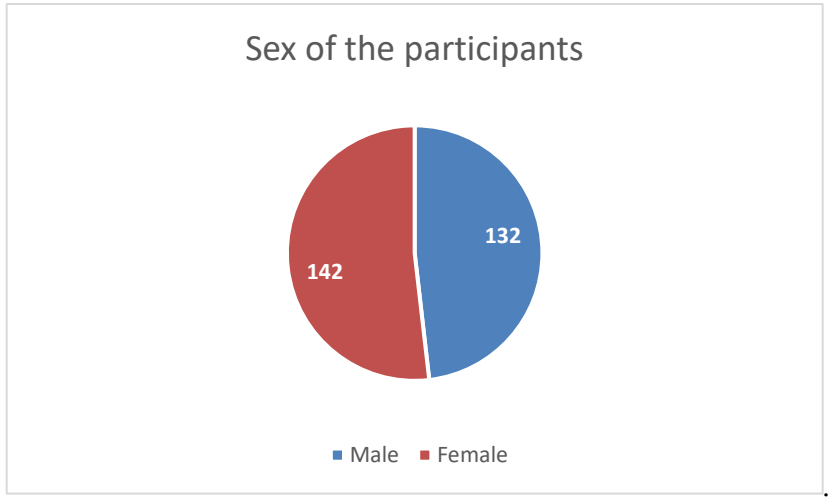


Figure 1a, distribution of the participants according to their sex

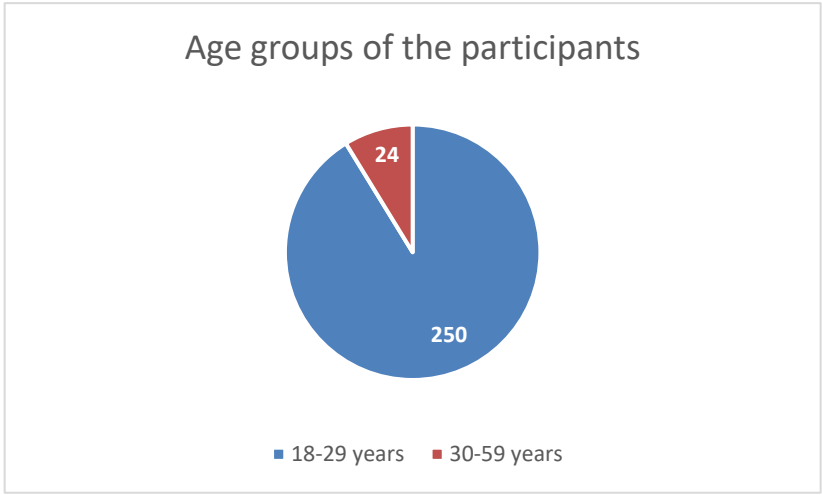


Figure 1b, distribution of the participants according to their age groups.

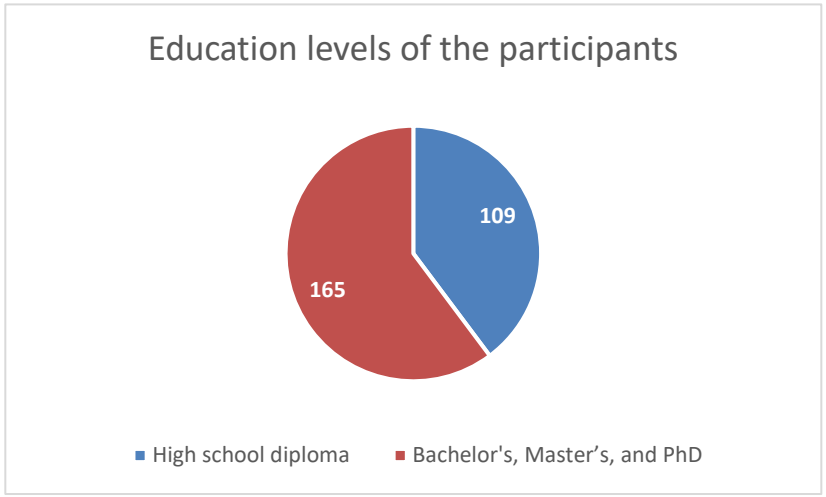


Figure 1c, distribution of the participants according to their education levels.

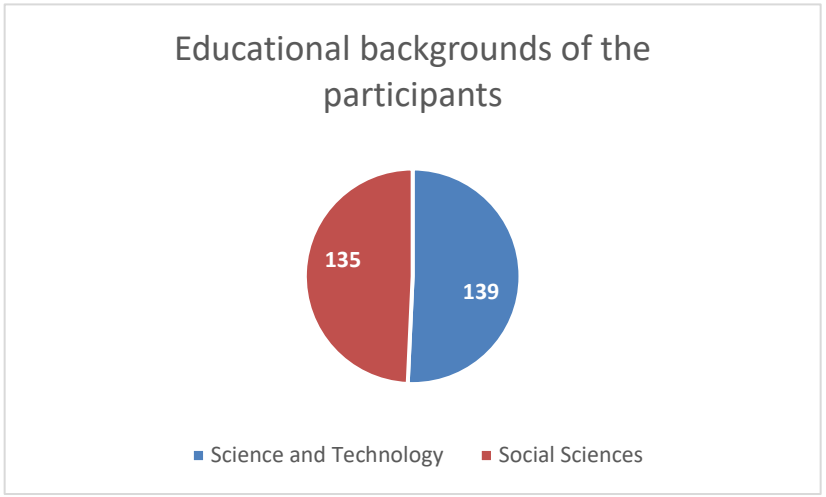


Figure 1d, distribution of the participants according to their educational backgrounds.

Figure 1, distribution of the participants according to their demographics (sex, age groups, education levels, and educational backgrounds).

Table 1. Participants' distribution according to their demographics among the study's different stimuli groups

Participants' demographic variables		Control	Misinformation	Inoculation	Inoculation + Misinformation	Total
Sex	Female	35	33	35	39	142
	Male	34	37	31	30	132
Age group	18-29 years	64	64	62	60	250
	30-59 years	5	6	4	9	24
Education level	High school diploma	24	30	32	23	109

	Bachelor's, Master's, and PhD	45	40	34	46	165
Educational background	Science and Technology	34	38	30	37	139
	Social Sciences	35	32	36	32	135

The effects of the study's three stimuli on the study's seven dependent variables (misinformation, inoculation, and inoculation followed by misinformation) were analyzed. Table 2 summarizes the means and standard deviations of each of the dependent variables (Trust in Climate Scientists, Anthropogenic Climate Change Acceptance, Perceived Scientific Consensus, Perceived Human Influence, Support for the efforts of climate mitigation and adaptation, Climate Change Importance, and Scientific Consensus Influence) for each of the study's stimulus groups.

Table 2. Means (standard deviations) across the study's stimuli for all dependent variables.

Dependent Variable	**Control**		**Misinformation**		**Inoculation**		**Inoculation + Misinformation**	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Trust in Climate Scientists	3.63	0.71	3.40	0.71	3.52	0.70	3.41	0.65
Anthropogenic Climate Change Acceptance	3.59	0.76	3.45	0.61	3.41	0.57	3.40	0.50
Perceived Scientific Consensus	74.06	22.73	56.61	29.32	68.86	19.89	60.94	23.98
Perceived Human Influence	51.57	30.40	51.27	28.33	50.49	30.00	46.81	31.15
Support for the efforts of climate mitigation and adaptation	4.31	0.75	4.38	0.48	4.24	0.57	4.34	0.52
Climate Change Importance	4.08	0.86	3.81	1.03	4.02	0.75	4.03	0.77
Scientific Consensus Influence	3.10	0.76	3.00	0.73	3.32	0.73	3.19	0.81

Overall	144.34	42.86	125.91	50.16	137.86	41.48	126.12	44.18

The aggregated mean value of the "Trust in Climate Scientists" dependent variable was 3.49 (SD = 0.70, Cronbach's α = 0.702). The highest mean value of the "Trust in Climate Scientists" dependent variable (M= 3.63, SD = 0.71) was for the control group. The lowest mean value of the "Trust in Climate Scientists" dependent variable (M = 3.40, SD = 0.71) was for the misinformation stimulus group. The aggregated mean value of the "Anthropogenic Climate Change Acceptance" dependent variable was 3.46 (SD = 0.62, Cronbach's α = 0.295). The highest mean value of the "Anthropogenic Climate Change Acceptance" dependent variable (M= 3.59, SD = 0.76) was for the control group. The lowest mean value of the "Anthropogenic Climate Change Acceptance" dependent variable (M = 3.40, SD = 0.50) was for the misinformation + inoculation stimulus group.

The aggregated mean value of the "Perceived Scientific Consensus" dependent variable was 65.05 (SD = 25.10). The highest mean value of the "Perceived Scientific Consensus" dependent variable (M= 74.06, SD = 22.73) was for the control group. The lowest mean value of the "Perceived Scientific Consensus" dependent variable (M = 56.61, SD = 29.32) was for the misinformation stimulus group.

The aggregated mean value of the "Perceived Human Influence" dependent variable was 50.03 (SD = 29.88, Cronbach's α = 0.919). The highest mean value of the "Perceived Human Influence" dependent variable (M= 51.57, SD = 30.40) was for the control group. The lowest mean value of the "Perceived Human Influence" dependent variable (M = 46.81, SD = 31.15) was for the misinformation + inoculation stimulus group.

The aggregated mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable was 4.32 (SD = 0.59, Cronbach's α = 0.822). The highest mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable (M= 4.38, SD = 0.48) was for the misinformation stimulus group. The lowest mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable (M = 4.24, SD = 0.57) was for the inoculation stimulus group.

The aggregated mean value of the "Climate Change Importance" dependent variable was 3.98 (SD = 0.86, Cronbach's α = 0.684). The highest mean value of the "Climate Change Importance" dependent variable (M= 4.08, SD = 0.86) was for the control group. The lowest mean value of the "Climate Change Importance" dependent variable (M = 3.81, SD = 1.03) was for the misinformation stimulus group.

The aggregated mean value of the "Scientific Consensus Influence" dependent variable was 3.15 (SD = 0.76, Cronbach's α = 0.718). The highest mean value of the "Scientific Consensus Influence" dependent variable (M= 3.32, SD = 0.73) was for the inoculation stimulus group. The lowest mean value of the "Scientific Consensus Influence" dependent variable (M = 3.00, SD = 0.73) was for the misinformation stimulus group. The highest value of the "Overall" (M= 144.34, SD = 42.86) was for the control group. The lowest value of the "Overall" (M = 125.91, SD = 50.16) was for the misinformation stimulus group.

The effects of the study's three stimuli (misinformation, inoculation, and inoculation followed by misinformation) on the study's seven dependent variables were also investigated while considering the sex of the participants as an intervening factor. The distribution of the female participants between the study's four groups: control (n = 35), misinformation-only (n = 33), inoculation-only (n = 35), and inoculation + misinformation (n = 39). Table 3 summarizes the means and standard deviations of each of the dependent variables (Trust in Climate Scientists, Anthropogenic Climate Change Acceptance, Perceived Scientific Consensus, Perceived Human Influence, Support for the efforts of climate mitigation and adaptation, Climate Change Importance, and Scientific Consensus Influence) for each of the study's stimulus groups while splitting the participants by sex into females and males.

Table 3. Means (standard deviations) across the study's stimuli for all dependent variables for each sex.

Dependent variable	**Sex**	**Control**	**Misinformation**	**Inoculation**	**Inoculation + Misinformation**

		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Trust in Climate Scientists	Female	3.62	0.76	3.44	0.68	3.62	0.74	3.36	0.66
	Male	3.65	0.67	3.37	0.75	3.40	0.64	3.49	0.65
Anthropogenic Climate Change Acceptance	Female	3.67	0.84	3.62	0.53	3.47	0.58	3.26	0.43
	Male	3.49	0.68	3.29	0.64	3.35	0.56	3.58	0.54
Perceived Scientific Consensus	Female	75.57	21.14	58.56	27.66	63.36	22.03	59.10	24.84
	Male	72.50	24.47	54.86	31.00	75.08	15.21	63.33	23.00
Perceived Human Influence	Female	53.22	30.58	56.19	26.40	48.17	29.63	41.17	32.17
	Male	49.88	30.58	46.87	29.61	53.12	30.69	54.13	28.67
Support for the efforts of climate mitigation and adaptation	Female	4.20	0.90	4.44	0.53	4.23	0.55	4.25	0.53
	Male	4.43	0.55	4.33	0.44	4.25	0.60	4.45	0.50
Climate Change Importance	Female	4.16	0.75	4.08	0.93	4.06	0.62	4.03	0.66
	Male	4.00	0.97	3.57	1.07	3.97	0.88	4.03	0.91
Scientific Consensus Influence	Female	3.21	0.80	3.05	0.77	3.25	0.80	3.17	0.80
	Male	2.99	0.71	2.95	0.69	3.40	0.65	3.21	0.82
Overall	Female	147.65	40.98	133.38	42.35	130.15	42.24	118.35	41.66
	Male	140.94	45.07	119.24	55.96	146.57	39.48	136.23	46.00

The aggregated mean value of the "Trust in Climate Scientists" dependent variable was 3.50 (SD = 0.71, Cronbach's α = 0.743) for the female participants and 3.47 (SD = 0.68, Cronbach's α = 0.656) for the male participants. The female participants' highest mean value of the "Trust in Climate Scientists" dependent variable (M= 3.62, SD = 0.76) was for the control group and was equal to the inoculation stimulus group (M = 3.62, SD = 0.74). The female participants' lowest mean value of the "Trust in Climate Scientists" dependent

variable (M = 3.36, SD = 0.66) was for the misinformation + inoculation stimulus group. The male participants' highest mean value of the "Trust in Climate Scientists" dependent variable (M= 3.65, SD = 0.67) was for the control group. The male participants' lowest mean value of the "Trust in Climate Scientists" dependent variable (M = 3.37, SD = 0.75) was for the misinformation stimulus group.

The aggregated mean value of the "Anthropogenic Climate Change Acceptance" dependent variable was 3.50 (SD = 0.62, Cronbach's α = 0.320) for the female participants and 3.42 (SD = 0.61, Cronbach's α = 0.268) for the male participants. The female participants' highest mean value of the "Anthropogenic Climate Change Acceptance" dependent variable (M= 3.67, SD = 0.84) was for the control group. The female participants' lowest mean value of the "Anthropogenic Climate Change Acceptance" dependent variable (M = 3.26, SD = 0.43) was for the misinformation + inoculation stimulus group. The male participants' highest mean value of the "Anthropogenic Climate Change Acceptance" dependent variable (M= 3.58, SD = 0.54) was for the misinformation + inoculation stimulus group. The male participants' lowest mean value of the "Anthropogenic Climate Change Acceptance" dependent variable (M = 3.29, SD = 0.64) was for the misinformation stimulus group.

The aggregated mean value of the "Perceived Scientific Consensus" dependent variable was 64.08 (SD = 24.73) for the female participants and 66.08 (SD = 25.54) for the male participants. The female participants' highest mean value of the "Perceived Scientific Consensus" dependent variable (M= 75.57, SD = 21.14) was for the control group. The female participants' lowest mean value of the "Perceived Scientific Consensus" dependent variable (M = 58.56, SD = 27.66) was for the misinformation stimulus group. The male participants' highest mean value of the "Perceived Scientific Consensus" dependent variable (M= 75.08, SD = 15.21) was for the inoculation stimulus group. The male participants' lowest mean value of the "Perceived Scientific Consensus" dependent variable (M = 54.86, SD = 31.0) was for the misinformation stimulus group.

The aggregated mean value of the "Perceived Human Influence" dependent variable was 49.36 (SD = 30.13, Cronbach's α = 0.924) for the female participants and 50.76 (SD = 29.71, Cronbach's α = 0.915) for the male participants. The female participants' highest mean

value of the "Perceived Human Influence" dependent variable (M= 56.19, SD = 26.40) was for the misinformation stimulus group. The female participants' lowest mean value of the "Perceived Human Influence" dependent variable (M = 41.17, SD = 32.17) was for the misinformation + inoculation stimulus group. The male participants' highest mean value of the "Perceived Human Influence" dependent variable (M= 54.13, SD = 28.67) was for the misinformation + inoculation stimulus group. The male participants' lowest mean value of the "Perceived Human Influence" dependent variable (M = 46.87, SD = 29.61) was for the misinformation stimulus group.

The aggregated mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable was 4.27 (SD = 0.65, Cronbach's α = 0.858) for the female participants and 4.37 (SD = 0.52, Cronbach's α = 0.761) for the male participants. The female participants' highest mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable (M= 4.44, SD = 0.53) was for the misinformation stimulus group. The female participants' lowest mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable (M = 4.20, SD = 0.90) was for the control group. The male participants' highest mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable (M= 4.45, SD = 0.50) was for the misinformation + inoculation stimulus group. The male participants' lowest mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable (M = 4.25, SD = 0.60) was for the inoculation stimulus group.

The aggregated mean value of the "Climate Change Importance" dependent variable was 4.08 (SD = 0.73, Cronbach's α = 0.613) for the female participants and 3.88 (SD = 0.98, Cronbach's α = 0.726) for the male participants. The female participants' highest mean value of the "Climate Change Importance" dependent variable (M= 4.16, SD = 0.75) was for the control group. The female participants' lowest mean value of the "Climate Change Importance" dependent variable (M = 4.03, SD = 0.66) was for the misinformation + inoculation stimulus group. The male participants' highest mean value of the "Climate Change Importance" dependent variable (M= 4.03, SD = 0.91) was for the misinformation + inoculation stimulus group. The male participants' lowest mean value of the "Climate Change Importance" dependent variable (M = 3.57, SD = 1.07) was for the misinformation stimulus group.

The aggregated mean value of the "Scientific Consensus Influence" dependent variable was 3.17 (SD = 0.79, Cronbach's α = 0.757) for the female participants and 3.13 (SD = 0.73, Cronbach's α = 0.671) for the male participants. The female participants' highest mean value of the "Scientific Consensus Influence" dependent variable (M= 3.25, SD = 0.80) was for the inoculation stimulus group. The female participants' lowest mean value of the "Scientific Consensus Influence" dependent variable (M = 3.05, SD = 0.77) was for the misinformation stimulus group. The male participants' highest mean value of the "Scientific Consensus Influence" dependent variable (M= 3.40, SD = 0.65) was for the inoculation stimulus group. The male participants' lowest mean value of the "Scientific Consensus Influence" dependent variable (M = 2.95, SD = 0.69) was for the misinformation stimulus group.

The female participants' highest value of the "Overall" (M= 147.65, SD = 40.98) was for the control group. The female participants' lowest value of the "Overall" (M = 118.35, SD = 41.66) was for the inoculation + misinformation stimulus group. The male participants' highest value of the "Overall" (M= 146.57, SD = 39.48) was for the inoculation stimulus group. The male participants' lowest value of the "Overall" (M = 119.24, SD = 55.96) was for the misinformation stimulus group.

The effects of the study's three stimuli (misinformation, inoculation, and inoculation followed by misinformation) on the study's seven dependent variables were also investigated while considering the age groups of the participants as an intervening factor. The distribution of the participants aged between 18 to 29 years between the study's four groups: control (n = 64), misinformation-only (n = 64), inoculation-only (n = 62), and inoculation + misinformation (n = 60). Table 4 summarizes the means and standard deviations of each of the dependent variables (Trust in Climate Scientists, Anthropogenic Climate Change Acceptance, Perceived Scientific Consensus, Perceived Human Influence, Support for the efforts of climate mitigation and adaptation, Climate Change Importance, and Scientific Consensus Influence) for each of the study's stimulus groups while splitting the participants by age group into 18-29 years old and 30-59 years old.

Table 4. Means (standard deviations) across the study's stimuli for all dependent variables for each age group.

Dependent Variable	Age group	Control		Misinformation		Inoculation		Inoculation + Misinformation	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Trust in Climate Scientists	18-29 years	3.64	0.68	3.35	0.70	3.52	0.70	3.36	0.65
	30-59 years	3.48	1.11	3.93	0.64	3.40	0.75	3.76	0.55
Anthropogenic Climate Change Acceptance	18-29 years	3.59	0.72	3.39	0.54	3.42	0.59	3.39	0.52
	30-59 years	3.56	1.34	4.03	0.99	3.25	0.19	3.47	0.40
Perceived Scientific Consensus	18-29 years	72.85	23.07	56.33	29.45	69.44	20.07	59.42	23.51
	30-59 years	89.50	8.91	59.58	30.35	60.00	16.33	71.11	26.01
Perceived Human Influence	18-29 years	52.48	29.50	50.59	27.98	49.03	29.59	43.77	30.24
	30-59 years	40.00	42.72	58.50	33.82	73.20	31.13	67.07	31.25
Support for the efforts of climate mitigation and adaptation	18-29 years	4.35	0.67	4.36	0.49	4.24	0.58	4.36	0.53
	30-59 years	3.88	1.56	4.63	0.38	4.25	0.57	4.21	0.47
Climate Change Importance	18-29 years	4.05	0.88	3.75	1.02	4.02	0.76	4.03	0.79
	30-59 years	4.40	0.42	4.42	1.02	4.00	0.71	4.06	0.63
Scientific Consensus Influence	18-29 years	3.05	0.75	2.93	0.72	3.30	0.74	3.15	0.81
	30-59 years	3.76	0.50	3.73	0.30	3.60	0.54	3.49	0.71
Overall	18-29 years	144.01	42.99	124.70	50.22	136.97	42.13	121.47	42.29
	30-59 years	148.58	45.77	138.83	52.19	151.70	30.35	157.15	46.43

The aggregated mean value of the "Trust in Climate Scientists" dependent variable was 3.47 (SD = 0.69, Cronbach's $\alpha = 0.694$) for the

18-29 years old participants and 3.68 (SD = 0.72, Cronbach's α = 0.783) for the 30-59 years old participants. The 18-29 years old participants' highest mean value of the "Trust in Climate Scientists" dependent variable (M= 3.64, SD = 0.68) was for the control group. The 18–29 years old participants' lowest mean value of the "Trust in Climate Scientists" dependent variable (M = 3.35, SD = 0.70) was for the misinformation stimulus group. The 30-59 years old participants' highest mean value of the "Trust in Climate Scientists" dependent variable (M= 3.93, SD = 0.64) was for the misinformation group. The 30-59 years old participants' lowest mean value of the "Trust in Climate Scientists" dependent variable (M = 3.40, SD = 0.75) was for the inoculation stimulus group.

The aggregated mean value of the "Anthropogenic Climate Change Acceptance" dependent variable was 3.45 (SD = 0.60, Cronbach's α = 0.248) for the 18-29 years old participants and 3.59 (SD = 0.81, Cronbach's α = 0.591) for the 30-59 years old participants. The 18-29 years old participants' highest mean value of the "Anthropogenic Climate Change Acceptance" dependent variable (M= 3.59, SD = 0.72) was for the control group. The 18-29 years old participants' lowest mean value of the "Anthropogenic Climate Change Acceptance" dependent variable (M = 3.39, SD = 0.54) was for the misinformation stimulus group and was equal to the inoculation + misinformation stimulus group (M = 3.39, SD = 0.52). The 30-59 years old participants' highest mean value of the "Anthropogenic Climate Change Acceptance" dependent variable (M= 4.03, SD = 0.99) was for the misinformation group. The 30-59 years old participants' lowest mean value of the "Anthropogenic Climate Change Acceptance" dependent variable (M = 3.25, SD = 0.19) was for the inoculation stimulus group.

The aggregated mean value of the "Perceived Scientific Consensus" dependent variable was 64.55 (SD = 25.12) for the 18-29 years old participants and 70.21 (SD = 24.76) for the 30-59 years old participants. The 18-29 years old participants' highest mean value of the "Perceived Scientific Consensus" dependent variable (M= 72.85, SD = 23.07) was for the control group. The 18-29 years old participants' lowest mean value of the "Perceived Scientific Consensus" dependent variable (M = 56.33, SD = 29.45) was for the misinformation stimulus group. The 30-59 years old participants' highest mean value of the "Perceived Scientific Consensus" dependent variable (M= 89.50, SD = 8.91) was for the control group. The 30-59 years old participants' lowest mean value of the "Perceived Scientific Consensus"

dependent variable (M = 59.58, SD = 30.35) was for the misinformation stimulus group.

The aggregated mean value of the "Perceived Human Influence" dependent variable was 49.05 (SD = 29.32, Cronbach's α = 0.914) for the 18-29 years old participants and 60.31 (SD = 34.20, Cronbach's α = 0.953) for the 30-59 years old participants. The 18-29 years old participants' highest mean value of the "Perceived Human Influence" dependent variable (M= 52.48, SD = 29.50) was for the control group. The 18-29 years old participants' lowest mean value of the "Perceived Human Influence" dependent variable (M = 43.77, SD = 30.24) was for the inoculation + misinformation stimulus group. The 30-59 years old participants' highest mean value of the "Perceived Human Influence" dependent variable (M= 73.20, SD = 31.13) was for the inoculation group. The 30-59 years old participants' lowest mean value of the "Perceived Human Influence" dependent variable (M = 40.00, SD = 42.72) was for the control group.

The aggregated mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable was 4.33 (SD = 0.57, Cronbach's α = 0.804) for the 18-29 years old participants and 4.25 (SD = 0.80, Cronbach's α = 0.922) for the 30-59 years old participants. The 18-29 years old participants' highest mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable (M= 4.36, SD = 0.49) was for the misinformation stimulus group and was equal to the inoculation + misinformation stimulus group (M = 4.36, SD = 0.53). The 18-29 years old participants' lowest mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable (M = 4.24, SD = 0.58) was for the inoculation stimulus group. The 30-59 years old participants' highest mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable (M= 4.63, SD = 0.38) was for the misinformation group. The 30-59 years old participants' lowest mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable (M = 3.88, SD = 1.56) was for the control group.

The aggregated mean value of the "Climate Change Importance" dependent variable was 3.96 (SD = 0.88, Cronbach's α = 0.687) for the 18-29 years old participants and 4.21 (SD = 0.71, Cronbach's α = 0.611) for the 30-59 years old participants. The 18-29 years old participants' highest mean value of the "Climate Change Importance" dependent variable (M= 4.05, SD = 0.88) was for the control

group. The 18-29 years old participants' lowest mean value of the "Climate Change Importance" dependent variable (M = 3.75, SD = 1.02) was for the misinformation stimulus group. The 30-59 years old participants' highest mean value of the "Climate Change Importance" dependent variable (M= 4.42, SD = 1.02) was for the misinformation group. The 30-59 years old participants' lowest mean value of the "Climate Change Importance" dependent variable (M = 4.00, SD = 0.71) was for the inoculation group.

The aggregated mean value of the "Scientific Consensus Influence" dependent variable was 3.11 (SD = 0.76, Cronbach's α = 0.719) for the 18-29 years old participants and 3.63 (SD = 0.54, Cronbach's α = 0.474) for the 30-59 years old participants. The 18-29 years old participants' highest mean value of the "Scientific Consensus Influence" dependent variable (M= 3.30, SD = 0.74) was for the inoculation stimulus group. The 18-29 years old participants' lowest mean value of the "Scientific Consensus Influence" dependent variable (M = 2.93, SD = 0.72) was for the misinformation stimulus group. The 30-59 years old participants' highest mean value of the "Scientific Consensus Influence" dependent variable (M= 3.76, SD = 0.50) was for the control group. The 30-59 years old participants' lowest mean value of the "Scientific Consensus Influence" dependent variable (M = 3.49, SD = 0.71) was for the inoculation + misinformation group.

The 18-29 years old participants' highest value of the "Overall" (M= 144.01, SD = 42.99) was for the control group. The 18-29 years old participants' lowest value of the "Overall" (M = 121.47, SD = 42.29) was for the inoculation + misinformation stimulus group. The 30-59 years old participants' highest value of the "Overall" (M= 157.15, SD = 46.43) was for the inoculation + misinformation stimulus group. The 30-59 years old participants' lowest value of the "Overall" (M = 138.83, SD = 52.19) was for the misinformation stimulus group.

The effects of the study's three stimuli (misinformation, inoculation, and inoculation followed by misinformation) on the study's seven dependent variables were also investigated while considering the education levels of the participants as an intervening factor. The distribution of the high school diploma participants between the study's four groups: control (n = 24), misinformation-only (n = 30),

inoculation-only (n = 32), and inoculation + misinformation (n = 23). Table 5 summarizes the means and standard deviations of each of the dependent variables (Trust in Climate Scientists, Anthropogenic Climate Change Acceptance, Perceived Scientific Consensus, Perceived Human Influence, Support for the efforts of climate mitigation and adaptation, Climate Change Importance, and Scientific Consensus Influence) for each of the study's stimulus groups while splitting the participants by education level into participants whose education level was a high school diploma and those whose education level was Bachelor's degree, Master's degree, or Ph.D.

Table 5. Means (standard deviations) across the study's stimuli for all dependent variables for each education level.

Dependent Variable	**Education level**	**Control**		**Misinformation**		**Inoculation**		**Inoculation + Misinformation**	
		Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Trust in Climate Scientists	High school diploma	3.52	0.78	3.17	0.70	3.50	0.72	3.37	0.75
	Bachelor's, Master's, and PhD	3.69	0.67	3.57	0.68	3.53	0.69	3.43	0.61
Anthropogenic Climate Change Acceptance	High school diploma	3.38	0.76	3.43	0.64	3.43	0.53	3.37	0.54
	Bachelor's, Master's, and PhD	3.69	0.75	3.46	0.59	3.39	0.61	3.41	0.49
Perceived Scientific Consensus	High school diploma	70.31	22.69	52.75	32.21	72.11	19.89	63.04	23.98
	Bachelor's, Master's, and PhD	76.06	22.75	59.50	27.00	65.81	19.68	59.89	24.18

Perceived Human Influence	High school diploma	44.26	29.63	53.03	29.84	49.14	30.37	54.54	34.93
	Bachelor's, Master's, and PhD	55.47	30.41	49.95	27.46	51.77	30.05	42.94	28.71
Support for the efforts of climate mitigation and adaptation	High school diploma	4.53	0.48	4.35	0.50	4.24	0.55	4.29	0.52
	Bachelor's, Master's, and PhD	4.19	0.85	4.40	0.48	4.24	0.60	4.37	0.52
Climate Change Importance	High school diploma	3.92	0.87	3.72	1.01	4.03	0.63	4.15	0.91
	Bachelor's, Master's, and PhD	4.17	0.85	3.88	1.05	4.00	0.85	3.97	0.69
Scientific Consensus Influence	High school diploma	2.93	0.63	2.79	0.65	3.34	0.58	3.07	0.66
	Bachelor's, Master's, and PhD	3.19	0.81	3.16	0.75	3.31	0.85	3.25	0.87
Overall	High school diploma	132.85	41.62	123.24	54.49	139.79	44.52	135.83	41.63
	Bachelor's, Master's, and PhD	150.47	42.70	127.91	47.27	136.05	38.99	121.26	45.06

The aggregated mean value of the "Trust in Climate Scientists" dependent variable was 3.39 (SD = 0.74, Cronbach's $\alpha = 0.738$) for the

participants whose education level was a high school diploma and 3.56 (SD = 0.66, Cronbach's α = 0.667) for those whose education levels was Bachelor's degree, Master's degree, or Ph.D. The high school diploma participants' highest mean value of the "Trust in Climate Scientists" dependent variable (M= 3.52, SD = 0.78) was for the control group. The high school diploma participants' lowest mean value of the "Trust in Climate Scientists" dependent variable (M = 3.17, SD = 0.70) was for the misinformation stimulus group. The Bachelor's degree, Master's degree, or Ph.D. participants' highest mean value of the "Trust in Climate Scientists" dependent variable (M= 3.69, SD = 0.67) was for the control group. The Bachelor's degree, Master's degree, or Ph.D. participants' lowest mean value of the "Trust in Climate Scientists" dependent variable (M = 3.43, SD = 0.61) was for the inoculation + misinformation stimulus group.

The aggregated mean value of the "Anthropogenic Climate Change Acceptance" dependent variable was 3.41 (SD = 0.61, Cronbach's α = 0.275) for the participants whose education level was a high school diploma and 3.50 (SD = 0.62, Cronbach's α = 0.308) for those whose education level was Bachelor's degree, Master's degree, or Ph.D. The high school diploma participants' highest mean value of the "Anthropogenic Climate Change Acceptance" dependent variable (M= 3.43, SD = 0.64) was for the misinformation group and was equal to the inoculation stimulus group (M = 3.43, SD = 0.53). The high school diploma participants' lowest mean value of the "Anthropogenic Climate Change Acceptance" dependent variable (M = 3.37, SD = 0.54) was for the inoculation + misinformation stimulus group. The Bachelor's degree, Master's degree, or Ph.D. participants' highest mean value of the "Anthropogenic Climate Change Acceptance" dependent variable (M= 3.69, SD = 0.75) was for the control group. The Bachelor's degree, Master's degree, or Ph.D. participants' lowest mean value of the "Anthropogenic Climate Change Acceptance" dependent variable (M = 3.39, SD = 0.61) was for the inoculation stimulus group.

The aggregated mean value of the "Perceived Scientific Consensus" dependent variable was 64.47 (SD = 26.12) for the participants whose education level was a high school diploma and 65.42 (SD = 24.47) for those whose education level was Bachelor's degree, Master's degree, or Ph.D. The high school diploma participants' highest mean value of the "Perceived Scientific Consensus" dependent

variable (M= 72.11, SD = 19.89) was for the inoculation stimulus group. The high school diploma participants' lowest mean value of the "Perceived Scientific Consensus" dependent variable (M= 52.75, SD = 32.21) was for the misinformation stimulus group. The Bachelor's degree, Master's degree, or Ph.D. participants' highest mean value of the "Perceived Scientific Consensus" dependent variable (M= 76.06, SD = 22.75) was for the control group. The Bachelor's degree, Master's degree, or Ph.D. participants' lowest mean value of the "Perceived Scientific Consensus" dependent variable (M = 59.50, SD = 27.00) was for the misinformation stimulus group.

The aggregated mean value of the "Perceived Human Influence" dependent variable was 50.27 (SD = 30.88, Cronbach's α = 0.934) for the participants whose education level was a high school diploma and 49.88 (SD = 29.29, Cronbach's α = 0.909) for those whose education level was Bachelor's degree, Master's degree, or Ph.D. The high school diploma participants' highest mean value of the "Perceived Human Influence" dependent variable (M= 54.54, SD = 34.93) was for the inoculation + misinformation stimulus group. The high school diploma participants' lowest mean value of the "Perceived Human Influence" dependent variable (M= 44.26, SD = 29.63) was for the control group. The Bachelor's degree, Master's degree, or Ph.D. participants' highest mean value of the "Perceived Human Influence" dependent variable (M= 55.47, SD = 30.41) was for the control group. The Bachelor's degree, Master's degree, or Ph.D. participants' lowest mean value of the "Perceived Human Influence" dependent variable (M = 42.94, SD = 28.71) was for the inoculation + misinformation stimulus group.

The aggregated mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable was 4.43 (SD = 0.52, Cronbach's α = 0.753) for the participants whose education level was a high school diploma and 4.30 (SD = 0.63, Cronbach's α = 0.853) for those whose education level was Bachelor's degree, Master's degree, or Ph.D. The high school diploma participants' highest mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable (M= 4.53, SD = 0.48) was for the control group. The high school diploma participants' lowest mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable (M= 4.24, SD = 0.55) was for the inoculation stimulus group. The Bachelor's degree, Master's degree, or Ph.D. participants' highest mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable (M=

4.40, SD = 0.48) was for the misinformation stimulus group. The Bachelor's degree, Master's degree, or Ph.D. participants' lowest mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable (M = 4.19, SD = 0.85) was for the control group.

The aggregated mean value of the "Climate Change Importance" dependent variable was 3.94 (SD = 0.86, Cronbach's α = 0.625) for the participants whose education level was a high school diploma and 4.01 (SD = 0.87, Cronbach's α = 0.724) for those whose education level was Bachelor's degree, Master's degree, or Ph.D. The high school diploma participants' highest mean value of the "Climate Change Importance" dependent variable (M= 4.15, SD = 0.91) was for the inoculation + misinformation stimulus group. The high school diploma participants' lowest mean value of the "Climate Change Importance" dependent variable (M= 3.72, SD = 1.01) was for the misinformation stimulus group. The Bachelor's degree, Master's degree, or Ph.D. participants' highest mean value of the "Climate Change Importance" dependent variable (M= 4.17, SD = 0.85) was for the control group. The Bachelor's degree, Master's degree, or Ph.D. participants' lowest mean value of the "Climate Change Importance" dependent variable (M = 3.88, SD = 1.05) was for the misinformation stimulus group.

The aggregated mean value of the "Scientific Consensus Influence" dependent variable was 3.04 (SD = 0.66, Cronbach's α = 0.605) for the participants whose education level was a high school diploma and 3.22 (SD = 0.82, Cronbach's α = 0.762) for those whose education level was Bachelor's degree, Master's degree, or Ph.D. The high school diploma participants' highest mean value of the "Scientific Consensus Influence" dependent variable (M= 3.34, SD = 0.58) was for the inoculation stimulus group. The high school diploma participants' lowest mean value of the "Scientific Consensus Influence" dependent variable (M= 2.79, SD = 0.65) was for the misinformation stimulus group. The Bachelor's degree, Master's degree, or Ph.D. participants' highest mean value of the "Scientific Consensus Influence" dependent variable (M= 3.31, SD = 0.85) was for the inoculation stimulus group. The Bachelor's degree, Master's degree, or Ph.D. participants' lowest mean value of the "Scientific Consensus Influence" dependent variable (M = 3.16, SD = 0.75) was for the misinformation stimulus group.

The high school diploma participants' highest value of the "Overall" (M= 139.79, SD = 44.52) was for the inoculation stimulus group. The high school diploma participants' lowest value of the "Overall" (M= 123.24, SD = 54.49) was for the misinformation stimulus group. The Bachelor's degree, Master's degree, or Ph.D. participants' highest value of the "Overall" (M= 150.47, SD = 42.70) was for the control group. The Bachelor's degree, Master's degree, or Ph.D. participants' lowest value of the "Overall" (M = 121.26, SD = 45.06) was for the inoculation + misinformation stimulus group.

The effects of the study's three stimuli (misinformation, inoculation, and inoculation followed by misinformation) on the study's seven dependent variables were also investigated while considering the educational backgrounds of the participants as an intervening factor. The distribution of the participants who have a Science and Technology background between the study's four groups: control (n = 34), misinformation-only (n = 38), inoculation-only (n = 30), and inoculation + misinformation (n = 37). Table 6 summarizes the means and standard deviations of each of the dependent variables (Trust in Climate Scientists, Anthropogenic Climate Change Acceptance, Perceived Scientific Consensus, Perceived Human Influence, Support for the efforts of climate mitigation and adaptation, Climate Change Importance, and Scientific Consensus Influence) for each of the study's stimulus groups while splitting the participants by educational background into participants whose educational background was Science and Technology and those whose educational background was Social Sciences.

Table 6. Means (standard deviations) across the study's stimuli for all dependent variables for each educational background.

Dependent Variable	**Educational background**	**Control**		**Misinformation**		**Inoculation**		**Inoculation + Misinformation**	
		Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Trust in Climate Scientists	Science and Technology	3.56	0.82	3.45	0.78	3.23	0.58	3.38	0.65

	Social Sciences	3.70	0.58	3.34	0.63	3.76	0.70	3.45	0.66
Anthropogenic Climate Change Acceptance	Science and Technology	3.31	0.77	3.39	0.67	3.23	0.42	3.39	0.54
	Social Sciences	3.86	0.66	3.52	0.53	3.56	0.64	3.41	0.46
Perceived Scientific Consensus	Science and Technology	76.03	23.14	60.66	30.41	69.75	18.13	62.64	21.42
	Social Sciences	72.14	22.49	51.80	27.67	68.13	21.47	58.98	26.86
Perceived Human Influence	Science and Technology	52.56	31.32	55.18	28.08	44.96	31.20	52.00	28.79
	Social Sciences	50.61	29.90	46.61	28.36	55.11	28.58	40.80	33.12
Support for the efforts of climate mitigation and adaptation	Science and Technology	4.28	0.74	4.38	0.51	4.14	0.63	4.41	0.50
	Social Sciences	4.34	0.78	4.37	0.47	4.32	0.51	4.27	0.53
Climate Change Importance	Science and Technology	4.32	0.76	4.20	0.83	4.03	0.74	4.01	0.83
	Social Sciences	3.84	0.90	3.34	1.07	4.00	0.77	4.05	0.71
Scientific Consensus Influence	Science and Technology	2.94	0.69	3.20	0.64	3.35	0.73	3.11	0.85
	Social Sciences	3.26	0.80	2.76	0.76	3.30	0.74	3.28	0.75
Overall	Science and Technology	147.01	44.70	134.47	51.90	132.69	41.24	132.94	38.76
	Social Sciences	141.75	41.48	115.74	46.79	142.17	41.77	118.23	49.17

The aggregated mean value of the "Trust in Climate Scientists" dependent variable was 3.41 (SD = 0.72, Cronbach's α = 0.715) for the participants whose educational background was Science and Technology and 3.57 (SD = 0.66, Cronbach's α = 0.680) for those whose educational background was Social Sciences. The Science and Technology participants' highest mean value of the "Trust in Climate Scientists" dependent variable (M= 3.56, SD = 0.82) was for the control group. The Science and Technology participants' lowest mean value of the "Trust in Climate Scientists" dependent variable (M = 3.23, SD = 0.58) was for the inoculation stimulus group. The Social

Sciences participants' highest mean value of the "Trust in Climate Scientists" dependent variable (M= 3.76, SD = 0.70) was for the inoculation stimulus group. The Social Sciences participants' lowest mean value of the "Trust in Climate Scientists" dependent variable (M = 3.34, SD = 0.63) was for the misinformation stimulus group.

The aggregated mean value of the "Anthropogenic Climate Change Acceptance" dependent variable was 3.34 (SD = 0.61, Cronbach's $\alpha = 0.287$) for the participants whose educational background was Science and Technology and 3.59 (SD = 0.60, Cronbach's $\alpha = 0.241$) for those whose educational background was Social Sciences. The Science and Technology participants' highest mean value of the "Anthropogenic Climate Change Acceptance" dependent variable (M= 3.39, SD = 0.67) was for the misinformation stimulus group and was equal to the inoculation + misinformation stimulus group (M= 3.39, SD= 0.54). The Science and Technology participants' lowest mean value of the "Anthropogenic Climate Change Acceptance" dependent variable (M = 3.23, SD = 0.42) was for the inoculation stimulus group. The Social Sciences participants' highest mean value of the "Anthropogenic Climate Change Acceptance" dependent variable (M= 3.86, SD = 0.66) was for the control group. The Social Sciences participants' lowest mean value of the "Anthropogenic Climate Change Acceptance" dependent variable (M = 3.41, SD = 0.46) was for the inoculation + misinformation stimulus group.

The aggregated mean value of the "Perceived Scientific Consensus" dependent variable was 66.91 (SD = 24.55) for the participants whose educational background was Science and Technology and 63.13 (SD = 25.60) for those whose educational background was Social Sciences. The Science and Technology participants' highest mean value of the "Perceived Scientific Consensus" dependent variable (M= 76.03, SD = 23.14) was for the control group. The Science and Technology participants' lowest mean value of the "Perceived Scientific Consensus" dependent variable (M = 60.66, SD = 30.41) was for the misinformation stimulus group. The Social Sciences participants' highest mean value of the "Perceived Scientific Consensus" dependent variable (M= 72.14, SD = 22.49) was for the control group. The Social Sciences participants' lowest mean value of the "Perceived Scientific Consensus" dependent variable (M = 51.80, SD = 27.67) was for the misinformation stimulus group.

The aggregated mean value of the "Perceived Human Influence" dependent variable was 51.49 (SD = 29.67, Cronbach's α = 0.912) for the participants whose educational background was Science and Technology and 48.53 (SD = 30.13, Cronbach's α = 0.927) for those whose educational background was Social Sciences. The Science and Technology participants' highest mean value of the "Perceived Human Influence" dependent variable (M= 55.18, SD = 28.08) was for the misinformation stimulus group. The Science and Technology participants' lowest mean value of the "Perceived Human Influence" dependent variable (M = 44.96, SD = 31.20) was for the inoculation stimulus group. The Social Sciences participants' highest mean value of the "Perceived Human Influence" dependent variable (M= 55.11, SD = 28.58) was for the inoculation stimulus group. The Social Sciences participants' lowest mean value of the "Perceived Human Influence" dependent variable (M = 40.80, SD = 33.12) was for the inoculation + misinformation stimulus group.

The aggregated mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable was 4.31 (SD = 0.60, Cronbach's α = 0.811) for the participants whose educational background was Science and Technology and 4.33 (SD = 0.58, Cronbach's α = 0.835) for those whose educational background was Social Sciences. The Science and Technology participants' highest mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable (M= 4.41, SD = 0.50) was for the inoculation + misinformation stimulus group. The Science and Technology participants' lowest mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable (M = 4.14, SD = 0.63) was for the inoculation stimulus group. The Social Sciences participants' highest mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable (M= 4.37, SD = 0.47) was for the misinformation stimulus group. The Social Sciences participants' lowest mean value of the "Support for the efforts of climate mitigation and adaptation" dependent variable (M = 4.27, SD = 0.53) was for the inoculation + misinformation stimulus group.

The aggregated mean value of the "Climate Change Importance" dependent variable was 4.14 (SD = 0.80, Cronbach's α = 0.666) for the participants whose educational background was Science and Technology and 3.81 (SD = 0.90, Cronbach's α = 0.679) for those whose

educational background was Social Sciences. The Science and Technology participants' highest mean value of the "Climate Change Importance" dependent variable (M= 4.32, SD = 0.76) was for the control group. The Science and Technology participants' lowest mean value of the "Climate Change Importance" dependent variable (M = 4.01, SD = 0.83) was for the inoculation + misinformation stimulus group. The Social Sciences participants' highest mean value of the "Climate Change Importance" dependent variable (M= 4.05, SD = 0.71) was for the inoculation + misinformation stimulus group. The Social Sciences participants' lowest mean value of the "Climate Change Importance" dependent variable (M = 3.34, SD = 1.07) was for the misinformation stimulus group.

The aggregated mean value of the "Scientific Consensus Influence" dependent variable was 3.15 (SD = 0.74, Cronbach's α = 0.677) for the participants whose educational background was Science and Technology and 3.16 (SD = 0.78, Cronbach's α = 0.762) for those whose educational background was Social Sciences. The Science and Technology participants' highest mean value of the "Scientific Consensus Influence" dependent variable (M= 3.35, SD = 0.73) was for the inoculation stimulus group. The Science and Technology participants' lowest mean value of the "Scientific Consensus Influence" dependent variable (M = 2.94, SD = 0.69) was for the control group. The Social Sciences participants' highest mean value of the "Scientific Consensus Influence" dependent variable (M= 3.30, SD = 0.74) was for the inoculation stimulus group. The Social Sciences participants' lowest mean value of the "Scientific Consensus Influence" dependent variable (M = 2.76, SD = 0.76) was for the misinformation stimulus group.

The Science and Technology participants' highest value of the "Overall" (M= 147.01, SD = 44.70) was for the control group. The Science and Technology participants' lowest value of the "Overall" (M = 132.69, SD = 41.24) was for the inoculation stimulus group. The Social Sciences participants' highest value of the "Overall" (M= 142.17, SD = 41.77) was for the inoculation stimulus group. The Social Sciences participants' lowest value of the "Overall" (M = 115.74, SD = 46.79) was for the misinformation stimulus group.

Seven separate two-way (multivariant, Type-II) ANOVA were performed to investigate the significance of the effect of the study's different stimuli and to also investigate the effect of the demographic variables (sex, age group, education level, and educational

background) of the participants as intervening factors. The interactions between the study's stimuli with the participants' demographic variables were also analyzed. Table 7 shows the results of the first two-way (multivariant, Type-II) ANOVA that was performed to find the main effects of the difference in the study stimuli (control, misinformation, inoculation, and inoculation + misinformation) on the dependent variables. The model also analyzed the main effects of the participants' demographical differences in sex, age group, education level, and educational background on the dependent variables. Additionally, the model analyzed the interactions between the different study stimuli and each demographic variable between participants on the study's dependent variables.

Table 7. ANOVA results for the effects of the study's different stimuli, the effects of the demographic variables, and their interactions together.

Effects	**Dependent variable**	**Partial Eta Squared**	**F**	**p-value**
Stimuli	Trust in Climate Scientists	0.019	1.652	0.178
	Anthropogenic Climate Change Acceptance	0.017	1.421	0.237
	Perceived Scientific Consensus	0.083	7.625	0.000
	Perceived Human Influence	0.006	0.491	0.689
	Support for the efforts of climate mitigation and adaptation	0.009	0.729	0.536
	Climate Change Importance	0.018	1.538	0.205
	Scientific Consensus Influence	0.029	2.524	0.058
	Overall	0.038	3.387	0.019
Sex	Trust in Climate Scientists	0.000	0.064	0.801
	Anthropogenic Climate Change Acceptance	0.000	0.000	1.000

	Perceived Scientific Consensus	0.002	0.543	0.462
	Perceived Human Influence	0.001	0.175	0.676
	Support for the efforts of climate mitigation and adaptation	0.004	1.119	0.291
	Climate Change Importance	0.023	5.923	0.016
	Scientific Consensus Influence	0.001	0.326	0.569
	Overall	0.002	0.447	0.504
Age group	Trust in Climate Scientists	0.007	1.716	0.191
	Anthropogenic Climate Change Acceptance	0.010	2.468	0.117
	Perceived Scientific Consensus	0.008	2.005	0.158
	Perceived Human Influence	0.020	5.138	0.024
	Support for the efforts of climate mitigation and adaptation	0.000	0.022	0.882
	Climate Change Importance	0.002	0.486	0.487
	Scientific Consensus Influence	0.035	9.283	0.003
	Overall	0.022	5.745	0.017
Education level	Trust in Climate Scientists	0.013	3.402	0.066
	Anthropogenic Climate Change Acceptance	0.003	0.804	0.371
	Perceived Scientific Consensus	0.000	0.001	0.981
	Perceived Human Influence	0.001	0.174	0.677
	Support for the efforts of climate mitigation and adaptation	0.001	0.171	0.680

	Climate Change Importance	0.000	0.117	0.733
	Scientific Consensus Influence	0.005	1.346	0.247
	Overall	0.000	0.053	0.819
Educational background	Trust in Climate Scientists	0.012	3.129	0.078
	Anthropogenic Climate Change Acceptance	0.051	13.574	0.000
	Perceived Scientific Consensus	0.005	1.330	0.250
	Perceived Human Influence	0.002	0.427	0.514
	Support for the efforts of climate mitigation and adaptation	0.002	0.590	0.443
	Climate Change Importance	0.051	13.529	0.000
	Scientific Consensus Influence	0.000	0.068	0.795
	Overall	0.004	1.105	0.294
Stimuli * Sex	Trust in Climate Scientists	0.008	0.705	0.550
	Anthropogenic Climate Change Acceptance	0.044	3.882	0.010
	Perceived Scientific Consensus	0.017	1.467	0.224
	Perceived Human Influence	0.030	2.609	0.052
	Support for the efforts of climate mitigation and adaptation	0.010	0.898	0.443
	Climate Change Importance	0.017	1.428	0.235
	Scientific Consensus Influence	0.008	0.674	0.569

	Overall	0.036	3.117	0.027
Stimuli * Age group	Trust in Climate Scientists	0.014	1.166	0.323
	Anthropogenic Climate Change Acceptance	0.019	1.662	0.176
	Perceived Scientific Consensus	0.007	0.605	0.612
	Perceived Human Influence	0.041	3.589	0.014
	Support for the efforts of climate mitigation and adaptation	0.007	0.638	0.591
	Climate Change Importance	0.006	0.503	0.681
	Scientific Consensus Influence	0.005	0.401	0.752
	Overall	0.021	1.781	0.151
Stimuli * Education level	Trust in Climate Scientists	0.008	0.692	0.558
	Anthropogenic Climate Change Acceptance	0.010	0.827	0.480
	Perceived Scientific Consensus	0.014	1.244	0.294
	Perceived Human Influence	0.028	2.439	0.065
	Support for the efforts of climate mitigation and adaptation	0.017	1.436	0.233
	Climate Change Importance	0.010	0.848	0.469
	Scientific Consensus Influence	0.008	0.655	0.580
	Overall	0.024	2.090	0.102
Stimuli * Educational background	Trust in Climate Scientists	0.024	2.116	0.099
	Anthropogenic Climate Change Acceptance	0.019	1.608	0.188
	Perceived Scientific Consensus	0.006	0.521	0.668

	Perceived Human Influence	0.025	2.137	0.096
	Support for the efforts of climate mitigation and adaptation	0.009	0.794	0.498
	Climate Change Importance	0.049	4.367	0.005
	Scientific Consensus Influence	0.039	3.435	0.018
	Overall	0.022	1.903	0.130

The difference in the study's stimuli had a highly significant main effect on the "Perceived Scientific Consensus" dependent variable (p-value < 0.0001). The difference in the participants' sex had a significant main effect on the "Climate Change Influence" dependent variable (p-value = 0.016). The difference in the participants' age groups had a significant main effect on both the "Perceived Human Influence" (p-value = 0.024) and the "Scientific Consensus Influence" dependent variables (p-value = 0.003). The difference in the participants' educational backgrounds had a highly significant main effect on both the "Anthropogenic Climate Change Acceptance" (p-value < 0.001) and the "Climate Change Influence" dependent variables (p-value < 0.001). The interactions between the study's stimuli and the difference between the sex of the participants had a significant effect on the "Anthropogenic Climate Change Acceptance" (p-value = 0.01) and a marginally significant effect on the "Perceived Human Influence" dependent variables (p-value = 0.052). The interactions between the study's stimuli and the difference in the age groups of the participants had a significant effect on the "Perceived Human Influence" dependent variable (p-value = 0.014). The interactions between the study's stimuli and the difference in the educational backgrounds of the participants had a significant effect on the "Climate Change Importance" (p-value = 0.005) and the "Scientific Consensus Influence" dependent variables (p-value = 0.018). The difference in the study's stimuli had a significant main effect on the "Overall" (p-value = 0.019). The difference in the participants' age groups had a significant main effect on the "Overall" (p-value = 0.017). The interactions between the study's stimuli and the difference in the sex of the participants had a significant effect on the "Overall" (p-value = 0.027).

Table 8. Tukey post hoc test of the first ANOVA analysis

Dependent Variable			Mean Difference	Standard Error	p-value	95% Confidence Interval	
						Lower Bound	Upper Bound
Trust in Climate Scientists	Control	Misinformation	0.232	0.116	0.189	-0.067	0.531
		Inoculation	0.117	0.117	0.753	-0.187	0.420
		Inoculation + Misinformation	0.217	0.116	0.243	-0.083	0.518
	Misinformation	Control	-0.232	0.116	0.189	-0.531	0.067
		Inoculation	-0.115	0.117	0.759	-0.418	0.187
		Inoculation + Misinformation	-0.014	0.116	0.999	-0.314	0.285
	Inoculation	Control	-0.117	0.117	0.753	-0.420	0.187
		Misinformation	0.115	0.117	0.759	-0.187	0.418
		Inoculation + Misinformation	0.101	0.117	0.827	-0.203	0.404
	Inoculation + Misinformation	Control	-0.217	0.116	0.243	-0.518	0.083
		Misinformation	0.014	0.116	0.999	-0.285	0.314
		Inoculation	-0.101	0.117	0.827	-0.404	0.203
Anthropogenic Climate Change Acceptance	Control	Misinformation	0.137	0.100	0.519	-0.122	0.395
		Inoculation	0.173	0.101	0.321	-0.089	0.436
		Inoculation + Misinformation	0.188	0.100	0.240	-0.071	0.448
	Misinformation	Control	-0.137	0.100	0.519	-0.395	0.122
		Inoculation	0.036	0.101	0.984	-0.225	0.298
		Inoculation + Misinformation	0.051	0.100	0.955	-0.207	0.310
	Inoculation	Control	-0.173	0.101	0.321	-0.436	0.089
		Misinformation	-0.036	0.101	0.984	-0.298	0.225
		Inoculation + Misinformation	0.015	0.101	0.999	-0.247	0.277
	Inoculation + Misinformation	Control	-0.188	0.100	0.240	-0.448	0.071
		Misinformation	-0.051	0.100	0.955	-0.310	0.207
		Inoculation	-0.015	0.101	0.999	-0.277	0.247
	Control	Misinformation	17.451*	4.120	0.000	6.796	28.106

Perceived Scientific Consensus		Inoculation	5.194	4.182	0.601	-5.620	16.009
		Inoculation + Misinformation	13.116*	4.135	0.009	2.423	23.809
	Misinformation	Control	-17.451*	4.120	0.000	-28.106	-6.796
		Inoculation	-12.256*	4.167	0.019	-23.033	-1.480
		Inoculation + Misinformation	-4.335	4.120	0.719	-14.990	6.320
	Inoculation	Control	-5.194	4.182	0.601	-16.009	5.620
		Misinformation	12.256*	4.167	0.019	1.480	23.033
		Inoculation + Misinformation	7.922	4.182	0.233	-2.893	18.736
	Inoculation + Misinformation	Control	-13.116*	4.135	0.009	-23.809	-2.423
		Misinformation	4.335	4.120	0.719	-6.320	14.990
		Inoculation	-7.922	4.182	0.233	-18.736	2.893
Perceived Human Influence	Control	Misinformation	0.305	4.944	1.000	-12.481	13.092
		Inoculation	1.077	5.018	0.996	-11.901	14.055
		Inoculation + Misinformation	4.765	4.962	0.772	-8.067	17.598
	Misinformation	Control	-0.305	4.944	1.000	-13.092	12.481
		Inoculation	0.772	5.001	0.999	-12.160	13.704
		Inoculation + Misinformation	4.460	4.944	0.804	-8.327	17.247
	Inoculation	Control	-1.077	5.018	0.996	-14.055	11.901
		Misinformation	-0.772	5.001	0.999	-13.704	12.160
		Inoculation + Misinformation	3.688	5.018	0.883	-9.290	16.666
	Inoculation + Misinformation	Control	-4.765	4.962	0.772	-17.598	8.067
		Misinformation	-4.460	4.944	0.804	-17.247	8.327
		Inoculation	-3.688	5.018	0.883	-16.666	9.290
Support for the efforts of climate mitigation and adaptation	Control	Misinformation	-0.067	0.100	0.910	-0.327	0.193
		Inoculation	0.073	0.102	0.891	-0.191	0.337
		Inoculation + Misinformation	-0.029	0.101	0.992	-0.290	0.232
	Misinformation	Control	0.067	0.100	0.910	-0.193	0.327
		Inoculation	0.140	0.102	0.515	-0.123	0.403
		Inoculation + Misinformation	0.038	0.100	0.982	-0.222	0.298

	Inoculation	Control	-0.073	0.102	0.891	-0.337	0.191
		Misinformation	-0.140	0.102	0.515	-0.403	0.123
		Inoculation + Misinformation	-0.102	0.102	0.750	-0.366	0.162
	Inoculation + Misinformation	Control	0.029	0.101	0.992	-0.232	0.290
		Misinformation	-0.038	0.100	0.982	-0.298	0.222
		Inoculation	0.102	0.102	0.750	-0.162	0.366
Climate Change Importance	Control	Misinformation	0.273	0.140	0.212	-0.090	0.635
		Inoculation	0.065	0.142	0.969	-0.303	0.433
		Inoculation + Misinformation	0.051	0.141	0.984	-0.313	0.415
	Misinformation	Control	-0.273	0.140	0.212	-0.635	0.090
		Inoculation	-0.208	0.142	0.459	-0.575	0.159
		Inoculation + Misinformation	-0.222	0.140	0.391	-0.584	0.141
	Inoculation	Control	-0.065	0.142	0.969	-0.433	0.303
		Misinformation	0.208	0.142	0.459	-0.159	0.575
		Inoculation + Misinformation	-0.014	0.142	1.000	-0.382	0.354
	Inoculation + Misinformation	Control	-0.051	0.141	0.984	-0.415	0.313
		Misinformation	0.222	0.140	0.391	-0.141	0.584
		Inoculation	0.014	0.142	1.000	-0.354	0.382
Scientific Consensus Influence	Control	Misinformation	0.101	0.125	0.849	-0.222	0.425
		Inoculation	-0.220	0.127	0.310	-0.548	0.109
		Inoculation + Misinformation	-0.090	0.126	0.891	-0.415	0.235
	Misinformation	Control	-0.101	0.125	0.849	-0.425	0.222
		Inoculation	-0.321	0.127	0.057	-0.649	0.006
		Inoculation + Misinformation	-0.191	0.125	0.422	-0.515	0.132
	Inoculation	Control	0.220	0.127	0.310	-0.109	0.548
		Misinformation	0.321	0.127	0.057	-0.006	0.649
		Inoculation + Misinformation	0.130	0.127	0.736	-0.199	0.458
	Inoculation + Misinformation	Control	0.090	0.126	0.891	-0.235	0.415
		Misinformation	0.191	0.125	0.422	-0.132	0.515
		Inoculation	-0.130	0.127	0.736	-0.458	0.199

Overall	Control	Misinformation	18.432	7.433	0.066	-0.790	37.654
		Inoculation	6.479	7.544	0.826	-13.030	25.988
		Inoculation + Misinformation	18.219	7.459	0.072	-1.072	37.510
	Misinformation	Control	-18.432	7.433	0.066	-37.654	0.790
		Inoculation	-11.953	7.517	0.386	-31.393	7.488
		Inoculation + Misinformation	-0.213	7.433	1.000	-19.435	19.009
	Inoculation	Control	-6.479	7.544	0.826	-25.988	13.030
		Misinformation	11.953	7.517	0.386	-7.488	31.393
		Inoculation + Misinformation	11.740	7.544	0.406	-7.769	31.248
	Inoculation + Misinformation	Control	-18.219	7.459	0.072	-37.510	1.072
		Misinformation	0.213	7.433	1.000	-19.009	19.435
		Inoculation	-11.740	7.544	0.406	-31.248	7.769

The results of the Tukey post hoc test of the first ANOVA analysis (Table 8) showed that the difference in the mean values of the control group and the misinformation stimulus group for the Perceived Scientific Consensus dependent variable was highly significant (p-value <0.001). Also, the difference in the mean values of the control group and the inoculation + misinformation stimulus group for the Perceived Scientific Consensus dependent variable was significant (p-value = 0.009). Additionally, the difference in the mean values of the misinformation stimulus group and the inoculation stimulus group for the Perceived Scientific Consensus dependent variable was significant (p-value = 0.019).

Table 9 shows the results of the second two-way (multivariant, Type-II) ANOVA that was performed to find the main effects of the misinformation stimulus on the dependent variables. The model also analyzed the main effects of the participants' demographical differences in sex, age group, education level, and educational background on the dependent variables. Additionally, the model analyzed the interactions between the misinformation stimulus and each demographic variable between participants on the dependent variables of the study.

Table 9. ANOVA results for the effects of the misinformation stimulus, the effects of the demographic variables, and their interactions together.

Effects	**Dependent variable**	**Partial Eta Squared**	**F**	**p-value**
Misinformation	Trust in Climate Scientists	0.023	3.060	0.083
	Anthropogenic Climate Change Acceptance	0.008	0.993	0.321
	Perceived Scientific Consensus	0.102	14.608	0.000
	Perceived Human Influence	0.000	0.000	0.988
	Support for the efforts of climate mitigation and adaptation	0.002	0.270	0.604
	Climate Change Importance	0.027	3.589	0.060
	Scientific Consensus Influence	0.004	0.569	0.452
	Overall	0.037	5.003	0.027
Sex	Trust in Climate Scientists	0.000	0.018	0.893
	Anthropogenic Climate Change Acceptance	0.015	1.957	0.164
	Perceived Scientific Consensus	0.004	0.486	0.487
	Perceived Human Influence	0.020	2.619	0.108
	Support for the efforts of climate mitigation and adaptation	0.001	0.075	0.784
	Climate Change Importance	0.062	8.461	0.004
	Scientific Consensus Influence	0.002	0.248	0.619

	Overall	0.017	2.219	0.139
Age group	Trust in Climate Scientists	0.004	0.490	0.485
	Anthropogenic Climate Change Acceptance	0.028	3.653	0.058
	Perceived Scientific Consensus	0.002	0.284	0.595
	Perceived Human Influence	0.002	0.306	0.581
	Support for the efforts of climate mitigation and adaptation	0.001	0.068	0.795
	Climate Change Importance	0.004	0.579	0.448
	Scientific Consensus Influence	0.064	8.807	0.004
	Overall	0.000	0.003	0.957
Education level	Trust in Climate Scientists	0.033	4.436	0.037
	Anthropogenic Climate Change Acceptance	0.005	0.709	0.401
	Perceived Scientific Consensus	0.011	1.441	0.232
	Perceived Human Influence	0.005	0.688	0.408
	Support for the efforts of climate mitigation and adaptation	0.010	1.291	0.258
	Climate Change Importance	0.010	1.296	0.257
	Scientific Consensus Influence	0.021	2.756	0.099
	Overall	0.012	1.626	0.205
Educational background	Trust in Climate Scientists	0.000	0.001	0.970
	Anthropogenic Climate Change Acceptance	0.058	7.974	0.005
	Perceived Scientific Consensus	0.015	1.940	0.166

	Perceived Human Influence	0.018	2.391	0.125
	Support for the efforts of climate mitigation and adaptation	0.002	0.226	0.635
	Climate Change Importance	0.153	23.273	0.000
	Scientific Consensus Influence	0.001	0.169	0.682
	Overall	0.025	3.272	0.073
Misinformation * Sex	Trust in Climate Scientists	0.003	0.377	0.540
	Anthropogenic Climate Change Acceptance	0.017	2.180	0.142
	Perceived Scientific Consensus	0.001	0.083	0.773
	Perceived Human Influence	0.000	0.047	0.830
	Support for the efforts of climate mitigation and adaptation	0.014	1.880	0.173
	Climate Change Importance	0.004	0.515	0.474
	Scientific Consensus Influence	0.003	0.395	0.531
	Overall	0.001	0.137	0.712
Misinformation * Age group	Trust in Climate Scientists	0.011	1.395	0.240
	Anthropogenic Climate Change Acceptance	0.014	1.888	0.172
	Perceived Scientific Consensus	0.005	0.636	0.427
	Perceived Human Influence	0.020	2.601	0.109
	Support for the efforts of climate mitigation and adaptation	0.009	1.168	0.282

	Climate Change Importance	0.008	1.094	0.297
	Scientific Consensus Influence	0.001	0.148	0.701
	Overall	0.003	0.390	0.533
Misinformation * Education level	Trust in Climate Scientists	0.002	0.316	0.575
	Anthropogenic Climate Change Acceptance	0.014	1.886	0.172
	Perceived Scientific Consensus	0.001	0.080	0.778
	Perceived Human Influence	0.021	2.703	0.103
	Support for the efforts of climate mitigation and adaptation	0.015	1.960	0.164
	Climate Change Importance	0.002	0.279	0.598
	Scientific Consensus Influence	0.002	0.247	0.620
	Overall	0.006	0.747	0.389
Misinformation * Educational background	Trust in Climate Scientists	0.006	0.780	0.379
	Anthropogenic Climate Change Acceptance	0.023	3.099	0.081
	Perceived Scientific Consensus	0.003	0.335	0.564
	Perceived Human Influence	0.000	0.023	0.878
	Support for the efforts of climate mitigation and adaptation	0.003	0.361	0.549
	Climate Change Importance	0.005	0.648	0.422
	Scientific Consensus Influence	0.074	10.294	0.002
	Overall	0.002	0.284	0.595

The misinformation stimulus had a highly significant main effect on the "Perceived Scientific Consensus" dependent variable (p-value < 0.001). The difference in the participants' sex had a significant main effect on the "Climate Change Influence" dependent variable (p-value = 0.004). The difference in the participants' age groups had a significant main effect on the "Scientific Consensus Influence" dependent variable (p-value = 0.004). The difference in the participants' education levels had a significant main effect on the "Trust in Climate Scientists" dependent variable (p-value = 0.037). The difference in the participants' educational backgrounds had a significant main effect on the "Anthropogenic Climate Change Acceptance" (p-value = 0.005) and a highly significant effect on the "Climate Change Influence" dependent variables (p-value < 0.001). The interactions between the misinformation stimulus and the difference in the educational backgrounds of the participants had a significant effect on the "Scientific Consensus Influence" dependent variable (p-value = 0.002). The misinformation stimulus had a significant main effect on the "Overall" (p-value = 0.027).

Table 10 shows the results of the third two-way (multivariant, Type-II) ANOVA that was performed to find the main effects of the inoculation stimulus on the dependent variables. The model also analyzed the main effects of the participants' demographical differences in sex, age group, education level, and educational background on the dependent variables. Additionally, the model analyzed the interactions between the inoculation stimulus and each demographic variable between participants on the dependent variables of the study.

Table 10. ANOVA results for the effects of the inoculation stimulus, the effects of the demographic variables, and their interactions together.

Effects	**Dependent variable**	**Partial Eta Squared**	**F**	**p-value**
Inoculation	Trust in Climate Scientists	0.007	0.897	0.345

	Anthropogenic Climate Change Acceptance	0.018	2.320	0.130
	Perceived Scientific Consensus	0.015	1.928	0.167
	Perceived Human Influence	0.000	0.003	0.960
	Support for the efforts of climate mitigation and adaptation	0.005	0.683	0.410
	Climate Change Importance	0.001	0.100	0.752
	Scientific Consensus Influence	0.025	3.181	0.077
	Overall	0.005	0.588	0.445
Sex	Trust in Climate Scientists	0.000	0.009	0.925
	Anthropogenic Climate Change Acceptance	0.000	0.006	0.936
	Perceived Scientific Consensus	0.015	1.849	0.176
	Perceived Human Influence	0.002	0.253	0.616
	Support for the efforts of climate mitigation and adaptation	0.011	1.435	0.233
	Climate Change Importance	0.017	2.126	0.147
	Scientific Consensus Influence	0.006	0.715	0.399
	Overall	0.009	1.103	0.296
Age group	Trust in Climate Scientists	0.004	0.462	0.498
	Anthropogenic Climate Change Acceptance	0.000	0.043	0.837
	Perceived Scientific Consensus	0.007	0.824	0.366
	Perceived Human Influence	0.000	0.026	0.872
	Support for the efforts of climate mitigation and	0.001	0.101	0.752

	adaptation			
	Climate Change Importance	0.001	0.112	0.738
	Scientific Consensus Influence	0.041	5.339	0.022
	Overall	0.003	0.347	0.557
Education level	Trust in Climate Scientists	0.011	1.403	0.238
	Anthropogenic Climate Change Acceptance	0.011	1.400	0.239
	Perceived Scientific Consensus	0.001	0.135	0.714
	Perceived Human Influence	0.011	1.355	0.247
	Support for the efforts of climate mitigation and adaptation	0.011	1.342	0.249
	Climate Change Importance	0.005	0.665	0.416
	Scientific Consensus Influence	0.000	0.027	0.870
	Overall	0.004	0.464	0.497
Educational background	Trust in Climate Scientists	0.047	6.185	0.014
	Anthropogenic Climate Change Acceptance	0.093	12.750	0.001
	Perceived Scientific Consensus	0.001	0.063	0.802
	Perceived Human Influence	0.004	0.449	0.504
	Support for the efforts of climate mitigation and adaptation	0.015	1.925	0.168
	Climate Change Importance	0.040	5.168	0.025
	Scientific Consensus Influence	0.016	2.074	0.152

	Overall	0.002	0.203	0.653
Inoculation * Sex	Trust in Climate Scientists	0.003	0.392	0.532
	Anthropogenic Climate Change Acceptance	0.001	0.106	0.746
	Perceived Scientific Consensus	0.025	3.211	0.076
	Perceived Human Influence	0.024	3.135	0.079
	Support for the efforts of climate mitigation and adaptation	0.001	0.165	0.685
	Climate Change Importance	0.004	0.481	0.489
	Scientific Consensus Influence	0.003	0.432	0.512
	Overall	0.036	4.716	0.032
Inoculation * Age group	Trust in Climate Scientists	0.000	0.007	0.934
	Anthropogenic Climate Change Acceptance	0.002	0.289	0.592
	Perceived Scientific Consensus	0.005	0.593	0.443
	Perceived Human Influence	0.046	6.061	0.015
	Support for the efforts of climate mitigation and adaptation	0.002	0.303	0.583
	Climate Change Importance	0.000	0.011	0.916
	Scientific Consensus Influence	0.003	0.388	0.534
	Overall	0.014	1.833	0.178
Inoculation * Education level	Trust in Climate Scientists	0.001	0.120	0.729
	Anthropogenic Climate Change Acceptance	0.009	1.094	0.298
	Perceived Scientific Consensus	0.017	2.156	0.145

	Perceived Human Influence	0.013	1.641	0.203
	Support for the efforts of climate mitigation and adaptation	0.012	1.506	0.222
	Climate Change Importance	0.008	0.970	0.327
	Scientific Consensus Influence	0.006	0.805	0.371
	Overall	0.022	2.866	0.093
Inoculation * Educational background	Trust in Climate Scientists	0.017	2.200	0.141
	Anthropogenic Climate Change Acceptance	0.008	0.968	0.327
	Perceived Scientific Consensus	0.003	0.420	0.518
	Perceived Human Influence	0.029	3.780	0.054
	Support for the efforts of climate mitigation and adaptation	0.001	0.130	0.719
	Climate Change Importance	0.026	3.299	0.072
	Scientific Consensus Influence	0.015	1.871	0.174
	Overall	0.024	3.024	0.084

The difference in the participants' age groups had a significant main effect on the "Scientific Consensus Influence" (p-value = 0.022) dependent variable. The difference in the participants' educational backgrounds had significant main effects on the "Trust in Climate Scientists" (p-value = 0.014), the "Climate Change Importance" (p-value = 0.025), and a highly significant effect on the "Anthropogenic Climate Change Acceptance" dependent variables (p-value < 0.001). The interactions between the inoculation stimulus and the difference in the age groups of the participants had a significant effect on the "Perceived Human Influence" dependent variable (p-value = 0.015). The interactions between the inoculation stimulus and the difference in the educational backgrounds of the participants

had a marginally significant effect on the "Perceived Human Influence" dependent variable (p-value = 0.054). The interactions between the inoculation stimulus and the difference in the sex of the participants had a significant effect on the "Overall" (p-value = 0.032).

Table 11 shows the results of the fourth two-way (multivariant, Type-II) ANOVA that was performed to find the main effects of the inoculation + misinformation stimulus on the dependent variables. The model also analyzed the main effects of the participants' demographical differences in sex, age group, education level, and educational background on the dependent variables. Additionally, the model analyzed the interactions between the inoculation + misinformation stimulus and each demographic variable between participants on the dependent variables of the study.

Table 11. ANOVA results for the effects of the inoculation + misinformation stimulus, the effects of the demographic variables, and their interactions together.

Effects	**Dependent variable**	**Partial Eta Squared**	**F**	**p-value**
Inoculation + Misinformation	Trust in Climate Scientists	0.026	3.352	0.069
	Anthropogenic Climate Change Acceptance	0.020	2.563	0.112
	Perceived Scientific Consensus	0.086	12.081	0.001
	Perceived Human Influence	0.009	1.126	0.291
	Support for the efforts of climate mitigation and	0.002	0.22	0.634

	adaptation		7	
	Climate Change Importance	0.002	0.301	0.584
	Scientific Consensus Influence	0.003	0.332	0.565
	Overall	0.055	7.498	0.007
Sex	Trust in Climate Scientists	0.010	1.290	0.258
	Anthropogenic Climate Change Acceptance	0.027	3.590	0.060
	Perceived Scientific Consensus	0.001	0.109	0.742
	Perceived Human Influence	0.002	0.266	0.607
	Support for the efforts of climate mitigation and adaptation	0.018	2.388	0.125
	Climate Change Importance	0.008	1.005	0.318
	Scientific Consensus Influence	0.003	0.412	0.522
	Overall	0.003	0.37	0.542

			3	
Age group	Trust in Climate Scientists	0.009	1.220	0.271
	Anthropogenic Climate Change Acceptance	0.003	0.392	0.533
	Perceived Scientific Consensus	0.031	4.056	0.046
	Perceived Human Influence	0.017	2.203	0.140
	Support for the efforts of climate mitigation and adaptation	0.006	0.799	0.373
	Climate Change Importance	0.000	0.011	0.917
	Scientific Consensus Influence	0.032	4.262	0.041
	Overall	0.037	4.955	0.028
Education level	Trust in Climate Scientists	0.004	0.557	0.457
	Anthropogenic Climate Change Acceptance	0.016	2.063	0.153
	Perceived Scientific Consensus	0.000	0.00	0.939

			6	
	Perceived Human Influence	0.000	0.020	0.888
	Support for the efforts of climate mitigation and adaptation	0.004	0.476	0.492
	Climate Change Importance	0.000	0.050	0.824
	Scientific Consensus Influence	0.007	0.849	0.358
	Overall	0.000	0.010	0.922
Educational background	Trust in Climate Scientists	0.007	0.959	0.329
	Anthropogenic Climate Change Acceptance	0.066	9.068	0.003
	Perceived Scientific Consensus	0.004	0.457	0.500
	Perceived Human Influence	0.013	1.691	0.196
	Support for the efforts of climate mitigation and adaptation	0.000	0.021	0.884
	Climate Change Importance	0.025	3.29	0.072

			6	
	Scientific Consensus Influence	0.031	4.079	0.045
	Overall	0.012	1.513	0.221
Inoculation + Misinformation * Sex	Trust in Climate Scientists	0.003	0.327	0.568
	Anthropogenic Climate Change Acceptance	0.019	2.512	0.115
	Perceived Scientific Consensus	0.004	0.504	0.479
	Perceived Human Influence	0.024	3.116	0.080
	Support for the efforts of climate mitigation and adaptation	0.000	0.022	0.882
	Climate Change Importance	0.010	1.266	0.263
	Scientific Consensus Influence	0.002	0.202	0.654
	Overall	0.022	2.893	0.091
Inoculation + Misinformation * Age group	Trust in Climate Scientists	0.014	1.85	0.175

			8	
	Anthropogenic Climate Change Acceptance	0.000	0.032	0.859
	Perceived Scientific Consensus	0.000	0.021	0.885
	Perceived Human Influence	0.067	9.167	0.003
	Support for the efforts of climate mitigation and adaptation	0.000	0.017	0.896
	Climate Change Importance	0.002	0.218	0.642
	Scientific Consensus Influence	0.008	0.973	0.326
	Overall	0.037	4.979	0.027
Inoculation + Misinformation * Education level	Trust in Climate Scientists	0.005	0.636	0.427
	Anthropogenic Climate Change Acceptance	0.006	0.837	0.362
	Perceived Scientific Consensus	0.009	1.204	0.275
	Perceived Human Influence	0.052	6.98	0.009

			4	
	Support for the efforts of climate mitigation and adaptation	0.025	3.302	0.072
	Climate Change Importance	0.019	2.493	0.117
	Scientific Consensus Influence	0.000	0.007	0.935
	Overall	0.047	6.280	0.013
Inoculation + Misinformation * Educational background	Trust in Climate Scientists	0.000	0.000	0.983
	Anthropogenic Climate Change Acceptance	0.025	3.260	0.073
	Perceived Scientific Consensus	0.000	0.021	0.885
	Perceived Human Influence	0.000	0.000	0.987
	Support for the efforts of climate mitigation and adaptation	0.006	0.820	0.367
	Climate Change Importance	0.037	4.958	0.028
	Scientific Consensus Influence	0.003	0.44	0.506

			6	
	Overall	0.000	0.00 7	0.934

The inoculation + misinformation stimulus had a highly significant main effect on the "Perceived Scientific Consensus" dependent variable (p-value < 0.001). The difference in the participants' age groups had significant main effects on the "Perceived Scientific Consensus" (p-value = 0.046) and the "Scientific Consensus Influence" (p-value = 0.041) dependent variables. The difference in the participants' educational backgrounds had significant main effects on the "Anthropogenic Climate Change Acceptance" (p-value = 0.003), and the "Scientific Consensus Influence" (p-value = 0.045) dependent variables. The interactions between the inoculation + misinformation stimulus and the difference in the age groups of the participants had a significant effect on the "Perceived Human Influence" dependent variable (p-value = 0.003). The interactions between the inoculation + misinformation stimulus and the difference in the education level of the participants had a significant effect on the "Perceived Human Influence" dependent variable (p-value = 0.009). The interactions between the inoculation + misinformation stimulus and the difference in the educational backgrounds of the participants had a significant effect on the "Climate Change Importance" dependent variable (p-value = 0.028).

The inoculation + misinformation stimulus had a significant main effect on the "Overall" (p-value = 0.007). The difference in the participants' age groups had a significant main effect on the "Overall" (p-value = 0.028). The interactions between the inoculation + misinformation stimulus and the difference in the age groups of the participants had a significant effect on the "Overall" (p-value = 0.027). The interactions between the inoculation + misinformation stimulus and the difference in the educational levels of the participants had a significant effect on the "Overall" (p-value = 0.013).

Table 12 shows the results of the fifth two-way (multivariant, Type-II) ANOVA that was performed to find the main effects of the difference between the inoculation stimulus and the misinformation stimulus on the dependent variables. The model also analyzed

the main effects of the participants' demographical differences in sex, age group, education level, and educational background on the dependent variables. Additionally, the model analyzed the interactions between the difference between the inoculation stimulus and the misinformation stimulus and each demographic variable between participants on the dependent variables of the study.

Table 12. ANOVA results for the effects of the difference between inoculation stimulus and misinformation stimulus, the effects of the demographic variables, and their interactions together.

Effects	**Dependent variable**	**Partial Eta Squared**	**F**	**p-value**
Inoculation / Misinformation	Trust in Climate Scientists	0.007	0.850	0.358
	Anthropogenic Climate Change Acceptance	0.003	0.357	0.551
	Perceived Scientific Consensus	0.065	8.737	0.004
	Perceived Human Influence	0.000	0.016	0.898
	Support for the efforts of climate mitigation and adaptation	0.019	2.406	0.123
	Climate Change Importance	0.021	2.663	0.105
	Scientific Consensus Influence	0.065	8.825	0.004

	Overall	0.020	2.587	0.110
Sex	Trust in Climate Scientists	0.004	0.551	0.459
	Anthropogenic Climate Change Acceptance	0.029	3.809	0.053
	Perceived Scientific Consensus	0.004	0.477	0.491
	Perceived Human Influence	0.000	0.006	0.936
	Support for the efforts of climate mitigation and adaptation	0.000	0.023	0.880
	Climate Change Importance	0.043	5.630	0.019
	Scientific Consensus Influence	0.000	0.024	0.876
	Overall	0.001	0.124	0.726
Age group	Trust in Climate Scientists	0.004	0.525	0.470
	Anthropogenic Climate Change Acceptance	0.023	2.935	0.089

	Perceived Scientific Consensus	0.000	0.005	0.943
	Perceived Human Influence	0.024	3.054	0.083
	Support for the efforts of climate mitigation and adaptation	0.008	0.957	0.330
	Climate Change Importance	0.007	0.849	0.359
	Scientific Consensus Influence	0.039	5.155	0.025
	Overall	0.011	1.338	0.250
Education level	Trust in Climate Scientists	0.026	3.413	0.067
	Anthropogenic Climate Change Acceptance	0.000	0.040	0.843
	Perceived Scientific Consensus	0.000	0.001	0.970
	Perceived Human Influence	0.002	0.200	0.655
	Support for the efforts of climate mitigation and adaptation	0.000	0.027	0.871

	Climate Change Importance	0.001	0.067	0.796
	Scientific Consensus Influence	0.004	0.514	0.475
	Overall	0.000	0.048	0.827
Educational background	Trust in Climate Scientists	0.018	2.294	0.132
	Anthropogenic Climate Change Acceptance	0.037	4.818	0.030
	Perceived Scientific Consensus	0.007	0.883	0.349
	Perceived Human Influence	0.001	0.132	0.717
	Support for the efforts of climate mitigation and adaptation	0.008	1.016	0.315
	Climate Change Importance	0.080	11.012	0.001
	Scientific Consensus Influence	0.024	3.072	0.082
	Overall	0.001	0.099	0.753

Inoculation / Misinformation * Sex	Trust in Climate Scientists	0.000	0.001	0.972
	Anthropogenic Climate Change Acceptance	0.013	1.696	0.195
	Perceived Scientific Consensus	0.028	3.615	0.060
	Perceived Human Influence	0.036	4.649	0.033
	Support for the efforts of climate mitigation and adaptation	0.009	1.163	0.283
	Climate Change Importance	0.016	2.046	0.155
	Scientific Consensus Influence	0.014	1.828	0.179
	Overall	0.046	6.144	0.015
Inoculation / Misinformation * Age group	Trust in Climate Scientists	0.013	1.601	0.208
	Anthropogenic Climate Change Acceptance	0.036	4.663	0.033
	Perceived Scientific Consensus	0.000	0.013	0.910

	Perceived Human Influence	0.010	1.300	0.256
	Support for the efforts of climate mitigation and adaptation	0.002	0.233	0.630
	Climate Change Importance	0.007	0.847	0.359
	Scientific Consensus Influence	0.001	0.108	0.743
	Overall	0.004	0.500	0.481
Inoculation / Misinformation * Education level	Trust in Climate Scientists	0.007	0.903	0.344
	Anthropogenic Climate Change Acceptance	0.001	0.134	0.715
	Perceived Scientific Consensus	0.019	2.434	0.121
	Perceived Human Influence	0.001	0.112	0.738
	Support for the efforts of climate mitigation and adaptation	0.000	0.009	0.926
	Climate Change Importance	0.001	0.160	0.690

	Scientific Consensus Influence	0.016	2.112	0.149
	Overall	0.004	0.473	0.493
Inoculation / Misinformation * Educational background	Trust in Climate Scientists	0.048	6.301	0.013
	Anthropogenic Climate Change Acceptance	0.006	0.731	0.394
	Perceived Scientific Consensus	0.011	1.405	0.238
	Perceived Human Influence	0.039	5.110	0.025
	Support for the efforts of climate mitigation and adaptation	0.011	1.402	0.239
	Climate Change Importance	0.052	6.897	0.010
	Scientific Consensus Influence	0.023	2.925	0.090
	Overall	0.037	4.894	0.029

The difference between the inoculation stimulus and the misinformation stimulus had a significant main effect on the "Perceived

Scientific Consensus" dependent variable (p-value = 0.004). The difference between the inoculation stimulus and the misinformation stimulus had a significant main effect on the "Scientific Consensus Influence" dependent variable (p-value = 0.004). The difference in the participants' sex had a significant main effect on the "Climate Change Importance" (p-value = 0.019) dependent variable and a marginally significant effect on the "Anthropogenic Climate Change Acceptance" (p-value = 0.053) dependent variable. The difference in the participants' age groups had a significant main effect on the "Scientific Consensus Influence" (p-value = 0.025) dependent variable. The difference in the participants' educational backgrounds had significant main effects on the "Anthropogenic Climate Change Acceptance" (p-value = 0.030), and the "Climate Change Importance" (p-value = 0.001) dependent variables. The interactions between the difference between the inoculation stimulus and the misinformation stimulus and the difference in the participants' sex had a significant effect on the "Perceived Human Influence" dependent variable (p-value = 0.033). The interactions between the difference between the inoculation stimulus and the misinformation stimulus and the difference in the age groups of the participants had a significant effect on the "Anthropogenic Climate Change Acceptance" dependent variable (p-value = 0.033). The interactions between the difference between the inoculation stimulus and the misinformation stimulus and the difference in the educational backgrounds of the participants had significant effects on the "Trust in Climate Scientists" (p-value = 0.013), the "Perceived Human Influence" (p-value = 0.025), the "Climate Change Importance" (p-value = 0.010) dependent variables. The interactions between the difference between the inoculation stimulus and the misinformation stimulus and the difference in the sex of the participants had a significant effect on the "Overall" (p-value = 0.015). The interactions between the difference between the inoculation stimulus and the misinformation stimulus and the difference in the educational backgrounds of the participants had a significant effect on the "Overall" (p-value = 0.029).

Table 13 shows the results of the sixth two-way (multivariant, Type-II) ANOVA that was performed to find the main effects of the difference between the misinformation stimulus and the inoculation + misinformation stimulus on the dependent variables. The model also analyzed the main effects of the participants' demographical differences in sex, age group, education level, and educational background on the dependent variables. Additionally, the model analyzed the interactions between the difference between the

misinformation stimulus and the inoculation + misinformation stimulus and each demographic variable between participants on the dependent variables of the study.

Table 13. ANOVA results for the effects of the difference between misinformation stimulus and inoculation + misinformation stimulus, the effects of the demographic variables, and their interactions together.

Effects	**Dependent variable**	**Partial Eta Squared**	**F**	**p-value**
Misinformation / Inoculation + Misinformation	Trust in Climate Scientists	0.000	0.017	0.898
	Anthropogenic Climate Change Acceptance	0.004	0.472	0.493
	Perceived Scientific Consensus	0.005	0.706	0.402
	Perceived Human Influence	0.006	0.774	0.381
	Support for the efforts of climate mitigation and adaptation	0.002	0.228	0.634
	Climate Change Importance	0.012	1.619	0.205
	Scientific Consensus Influence	0.011	1.398	0.239
	Overall	0.000	0.00	0.980

			1	
Sex	Trust in Climate Scientists	0.002	0.195	0.660
	Anthropogenic Climate Change Acceptance	0.000	0.009	0.927
	Perceived Scientific Consensus	0.000	0.007	0.932
	Perceived Human Influence	0.000	0.009	0.924
	Support for the efforts of climate mitigation and adaptation	0.000	0.046	0.831
	Climate Change Importance	0.029	3.809	0.053
	Scientific Consensus Influence	0.000	0.000	0.997
	Overall	0.000	0.000	0.986
Age group	Trust in Climate Scientists	0.036	4.878	0.029
	Anthropogenic Climate Change Acceptance	0.043	5.771	0.018
	Perceived Scientific Consensus	0.009	1.12	0.291

			5	
	Perceived Human Influence	0.057	7.741	0.006
	Support for the efforts of climate mitigation and adaptation	0.000	0.011	0.918
	Climate Change Importance	0.009	1.186	0.278
	Scientific Consensus Influence	0.032	4.280	0.041
	Overall	0.045	6.144	0.014
Education level	Trust in Climate Scientists	0.016	2.038	0.156
	Anthropogenic Climate Change Acceptance	0.000	0.001	0.972
	Perceived Scientific Consensus	0.001	0.066	0.797
	Perceived Human Influence	0.025	3.304	0.071
	Support for the efforts of climate mitigation and adaptation	0.006	0.736	0.393
	Climate Change Importance	0.001	0.08	0.768

			8	
	Scientific Consensus Influence	0.017	2.165	0.144
	Overall	0.007	0.874	0.352
Educational background	Trust in Climate Scientists	0.000	0.002	0.967
	Anthropogenic Climate Change Acceptance	0.018	2.304	0.132
	Perceived Scientific Consensus	0.012	1.547	0.216
	Perceived Human Influence	0.019	2.503	0.116
	Support for the efforts of climate mitigation and adaptation	0.002	0.259	0.612
	Climate Change Importance	0.061	8.380	0.004
	Scientific Consensus Influence	0.008	0.993	0.321
	Overall	0.024	3.168	0.077
Misinformation / Inoculation + Misinformation * Sex	Trust in Climate Scientists	0.012	1.62	0.204

			8	
	Anthropogenic Climate Change Acceptance	0.100	14.387	0.000
	Perceived Scientific Consensus	0.007	0.886	0.348
	Perceived Human Influence	0.035	4.654	0.033
	Support for the efforts of climate mitigation and adaptation	0.018	2.379	0.125
	Climate Change Importance	0.026	3.499	0.064
	Scientific Consensus Influence	0.009	1.199	0.276
	Overall	0.031	4.142	0.044
Misinformation / Inoculation + Misinformation * Age group	Trust in Climate Scientists	0.000	0.005	0.945
	Anthropogenic Climate Change Acceptance	0.023	3.051	0.083
	Perceived Scientific Consensus	0.008	1.102	0.296
	Perceived Human Influence	0.017	2.23	0.138

			0	
	Support for the efforts of climate mitigation and adaptation	0.015	1.946	0.165
	Climate Change Importance	0.004	0.581	0.447
	Scientific Consensus Influence	0.004	0.491	0.485
	Overall	0.017	2.226	0.138
Misinformation / Inoculation + Misinformation * Education level	Trust in Climate Scientists	0.015	1.995	0.160
	Anthropogenic Climate Change Acceptance	0.003	0.344	0.559
	Perceived Scientific Consensus	0.012	1.549	0.216
	Perceived Human Influence	0.010	1.252	0.265
	Support for the efforts of climate mitigation and adaptation	0.003	0.397	0.530
	Climate Change Importance	0.008	0.977	0.325
	Scientific Consensus Influence	0.002	0.29	0.585

			9	
	Overall	0.016	2.154	0.145
Misinformation / Inoculation + Misinformation * Educational background	Trust in Climate Scientists	0.007	0.846	0.359
	Anthropogenic Climate Change Acceptance	0.000	0.000	0.998
	Perceived Scientific Consensus	0.004	0.500	0.481
	Perceived Human Influence	0.000	0.031	0.860
	Support for the efforts of climate mitigation and adaptation	0.002	0.199	0.656
	Climate Change Importance	0.067	9.221	0.003
	Scientific Consensus Influence	0.040	5.414	0.022
	Overall	0.003	0.398	0.529

The difference in the participants' sex had a marginally significant main effect on the "Climate Change Importance" (p-value = 0.053) dependent variable. The difference in the participants' age groups had significant main effects on the "Trust in Climate Scientists" (p-

value = 0.029), the "Anthropogenic Climate Change Acceptance" (p-value = 0.018), the "Perceived Human Influence" (p-value = 0.006), and the "Scientific Consensus Influence" (p-value = 0.041) dependent variables. The difference in the participants' educational backgrounds had a significant main effect on the "Climate Change Importance" (p-value = 0.004) dependent variable. The interactions between the difference between the misinformation stimulus and the inoculation + misinformation stimulus and the difference in the participants' sex had a highly significant main effect on the "Anthropogenic Climate Change Acceptance" (p-value < 0.001), and a significant main effect on the "Perceived Human Influence" (p-value = 0.033) dependent variables. The interactions between the difference between the misinformation stimulus and the inoculation + misinformation stimulus and the difference in the educational backgrounds of the participants had significant effects on the "Climate Change Importance" (p-value = 0.003), and the "Scientific Consensus Influence" (p-value = 0.022) dependent variables. The difference in the participants' age groups had a significant main effect on the "Overall" (p-value = 0.014). The interactions between the difference between the misinformation stimulus and the inoculation + misinformation stimulus and the difference in the sex of the participants had a significant effect on the "Overall" (p-value = 0.014).

Table 14 shows the results of the seventh two-way (multivariant, Type-II) ANOVA that was performed to find the main effects of the difference between the inoculation stimulus and the inoculation + misinformation stimulus on the dependent variables. The model also analyzed the main effects of the participants' demographical differences in sex, age group, education level, and educational background on the dependent variables. Additionally, the model analyzed the interactions between the difference between the inoculation stimulus and the inoculation + misinformation stimulus and each demographic variable between participants on the study's dependent variables.

Table 14. ANOVA results for the effects of the difference between inoculation stimulus and inoculation + misinformation stimulus, the effects of the demographic variables, and their interactions together.

Effects	**Dependent variable**	**Partial Eta Squared**	**F**	**p-value**
Inoculation / Inoculation + Misinformation	Trust in Climate Scientists	0.005	0.605	0.438
	Anthropogenic Climate Change Acceptance	0.000	0.005	0.943
	Perceived Scientific Consensus	0.029	3.727	0.056
	Perceived Human Influence	0.005	0.574	0.450
	Support for the efforts of climate mitigation and adaptation	0.010	1.273	0.261
	Climate Change Importance	0.000	0.033	0.855
	Scientific Consensus Influence	0.009	1.103	0.296
	Overall	0.020	2.528	0.114
Sex	Trust in Climate Scientists	0.002	0.283	0.595
	Anthropogenic Climate Change Acceptance	0.026	3.316	0.071

	Perceived Scientific Consensus	0.033	4.287	0.040
	Perceived Human Influence	0.041	5.357	0.022
	Support for the efforts of climate mitigation and adaptation	0.014	1.742	0.189
	Climate Change Importance	0.001	0.116	0.734
	Scientific Consensus Influence	0.012	1.561	0.214
	Overall	0.060	8.011	0.005
Age group	Trust in Climate Scientists	0.011	1.342	0.249
	Anthropogenic Climate Change Acceptance	0.000	0.048	0.826
	Perceived Scientific Consensus	0.019	2.400	0.124
	Perceived Human Influence	0.095	13.075	0.000
	Support for the efforts of climate mitigation and adaptation	0.002	0.244	0.622

	Climate Change Importance	0.000	0.049	0.825
	Scientific Consensus Influence	0.017	2.186	0.142
	Overall	0.087	11.968	0.001
Education level	Trust in Climate Scientists	0.001	0.177	0.675
	Anthropogenic Climate Change Acceptance	0.001	0.143	0.706
	Perceived Scientific Consensus	0.018	2.337	0.129
	Perceived Human Influence	0.017	2.121	0.148
	Support for the efforts of climate mitigation and adaptation	0.004	0.487	0.487
	Climate Change Importance	0.005	0.611	0.436
	Scientific Consensus Influence	0.000	0.003	0.958
	Overall	0.027	3.433	0.066

Educational background	Trust in Climate Scientists	0.051	6.764	0.010
	Anthropogenic Climate Change Acceptance	0.043	5.576	0.020
	Perceived Scientific Consensus	0.000	0.011	0.917
	Perceived Human Influence	0.004	0.440	0.508
	Support for the efforts of climate mitigation and adaptation	0.003	0.392	0.533
	Climate Change Importance	0.000	0.003	0.954
	Scientific Consensus Influence	0.004	0.537	0.465
	Overall	0.002	0.261	0.610
Inoculation / Inoculation + Misinformation * Sex	Trust in Climate Scientists	0.013	1.616	0.206
	Anthropogenic Climate Change Acceptance	0.040	5.165	0.025
	Perceived Scientific Consensus	0.008	0.995	0.320

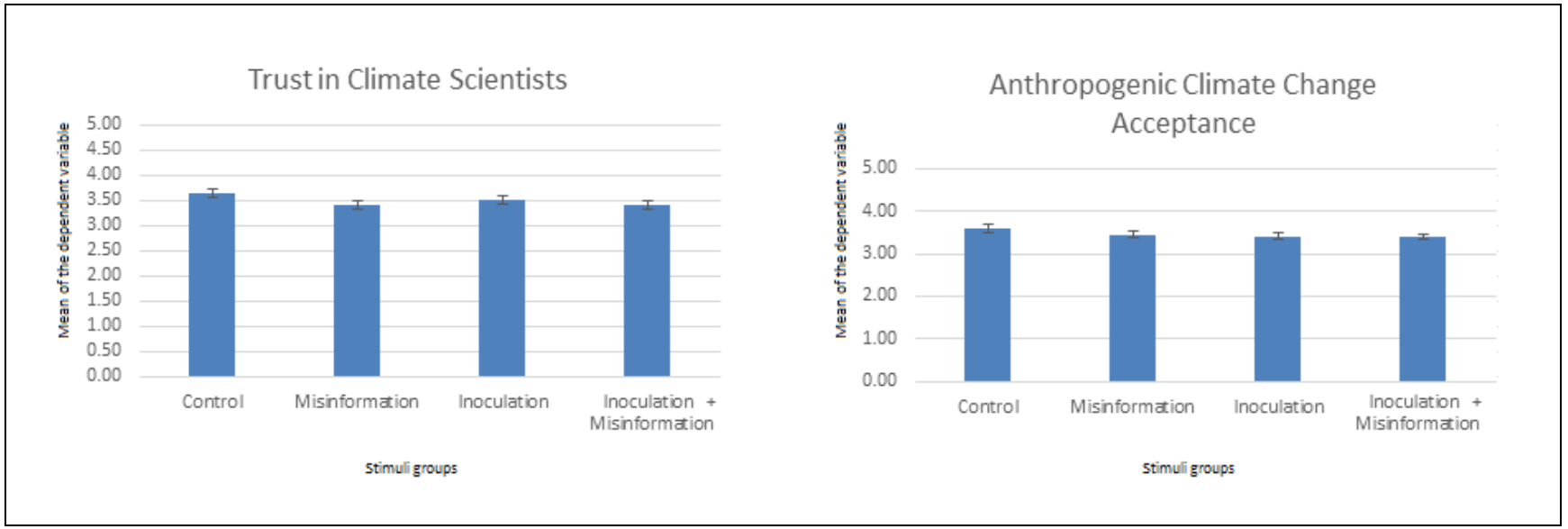
	Perceived Human Influence	0.000	0.002	0.966
	Support for the efforts of climate mitigation and adaptation	0.001	0.108	0.743
	Climate Change Importance	0.002	0.199	0.657
	Scientific Consensus Influence	0.000	0.033	0.855
	Overall	0.002	0.257	0.613
Inoculation / Inoculation + Misinformation * Age group	Trust in Climate Scientists	0.017	2.110	0.149
	Anthropogenic Climate Change Acceptance	0.007	0.905	0.343
	Perceived Scientific Consensus	0.008	0.979	0.324
	Perceived Human Influence	0.000	0.006	0.938
	Support for the efforts of climate mitigation and adaptation	0.003	0.375	0.541
	Climate Change Importance	0.001	0.113	0.738

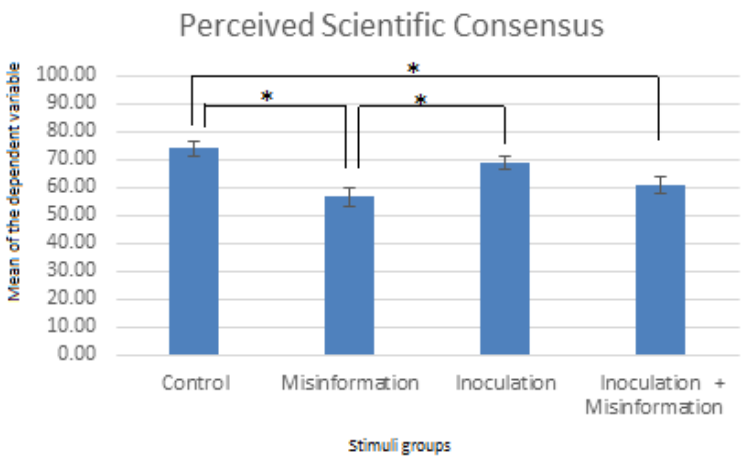
	Scientific Consensus Influence	0.001	0.071	0.790
	Overall	0.003	0.379	0.540
Inoculation / Inoculation + Misinformation * Education level	Trust in Climate Scientists	0.002	0.228	0.634
	Anthropogenic Climate Change Acceptance	0.000	0.040	0.841
	Perceived Scientific Consensus	0.000	0.048	0.828
	Perceived Human Influence	0.016	1.987	0.161
	Support for the efforts of climate mitigation and adaptation	0.003	0.435	0.511
	Climate Change Importance	0.003	0.420	0.518
	Scientific Consensus Influence	0.005	0.569	0.452
	Overall	0.006	0.780	0.379
Inoculation / Inoculation + Misinformation * Educational background	Trust in Climate Scientists	0.020	2.591	0.110

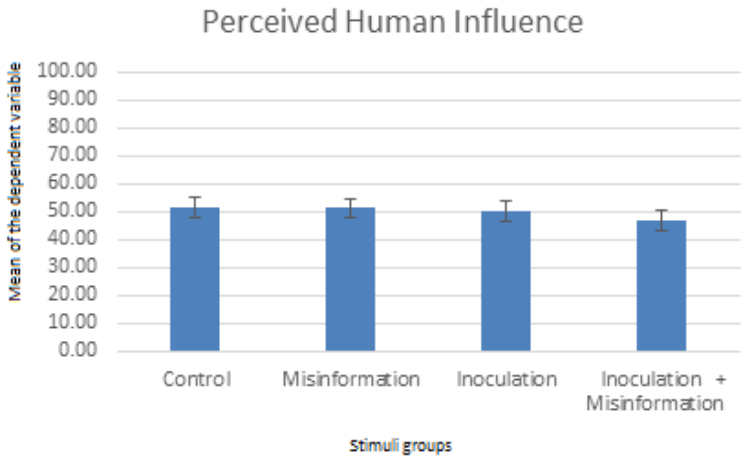
	Anthropogenic Climate Change Acceptance	0.006	0.803	0.372
	Perceived Scientific Consensus	0.002	0.230	0.633
	Perceived Human Influence	0.031	4.002	0.048
	Support for the efforts of climate mitigation and adaptation	0.018	2.283	0.133
	Climate Change Importance	0.002	0.189	0.664
	Scientific Consensus Influence	0.003	0.410	0.523
	Overall	0.023	2.966	0.088

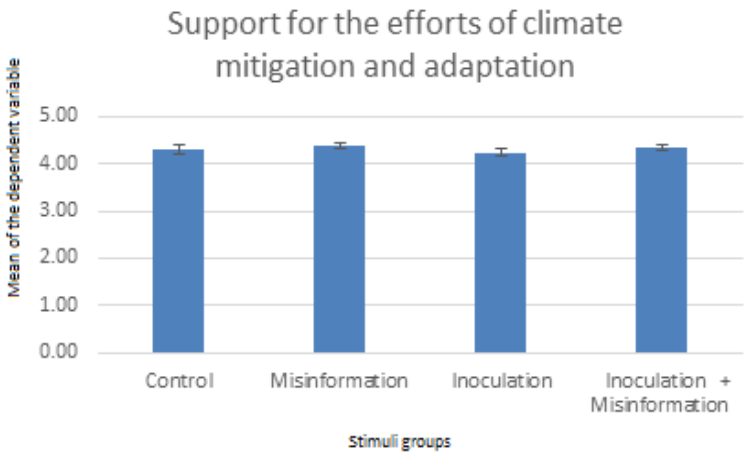
The difference in the participants' sex had significant main effects on the "Perceived Scientific Consensus" (p-value = 0.040), and the "Perceived Human Influence" (p-value = 0.022) dependent variables. The difference in the participants' age groups had a highly significant main effect on the "Perceived Human Influence" (p-value < 0.001) dependent variable. The difference in the participants' educational backgrounds had significant main effects on the "Trust in Climate Scientists" (p-value = 0.010), and "Anthropogenic Climate Change Acceptance" (p-value = 0.020) dependent variables. The interactions between the difference between the inoculation stimulus and the inoculation + misinformation stimulus and the difference in the participants' sex had a significant main effect on the "Anthropogenic Climate Change Acceptance" (p-value = 0.025) dependent variable. The interactions between the difference between

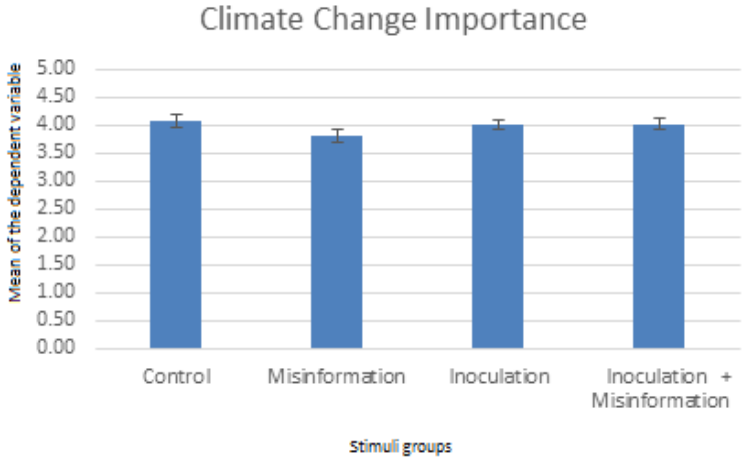
the inoculation stimulus and the inoculation + misinformation stimulus and the difference in the educational backgrounds of the participants had a significant effect on the "Perceived Human Influence" (p-value = 0.048) dependent variable. The difference in the participants' sex had a significant main effect on the "Overall" (p-value = 0.005). The difference in the participants' age groups had a highly significant main effect on the "Overall" (p-value < 0.001).




Perceived Scientific Consensus
Mean of the dependent variable
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
*
*
*
Control
Misinformation
Inoculation
Inoculation + Misinformation
Stimuli groups


Perceived Human Influence
Mean of the dependent variable
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Control
Misinformation
Inoculation
Inoculation + Misinformation
Stimuli groups


Support for the efforts of climate mitigation and adaptation
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
Control
Misinformation
Inoculation
Inoculation + Misinformation
Stimuli groups


Climate Change Importance
Mean of the dependent variable
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Control
Misinformation
Inoculation
Inoculation + Misinformation
Stimuli groups

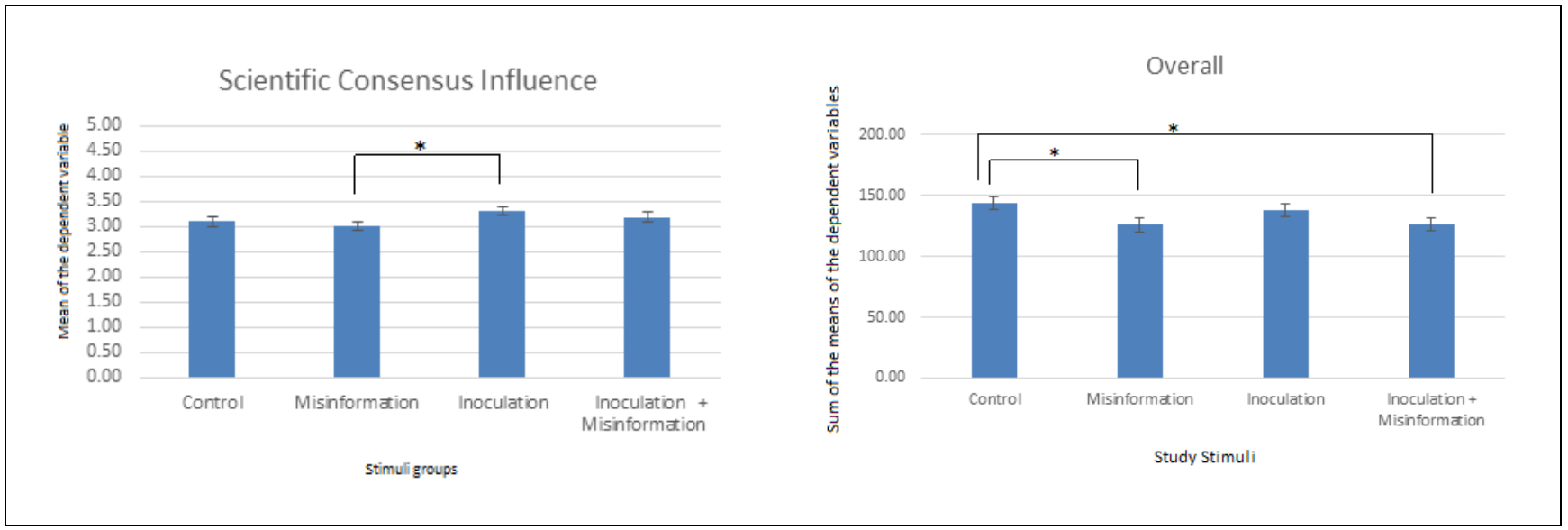
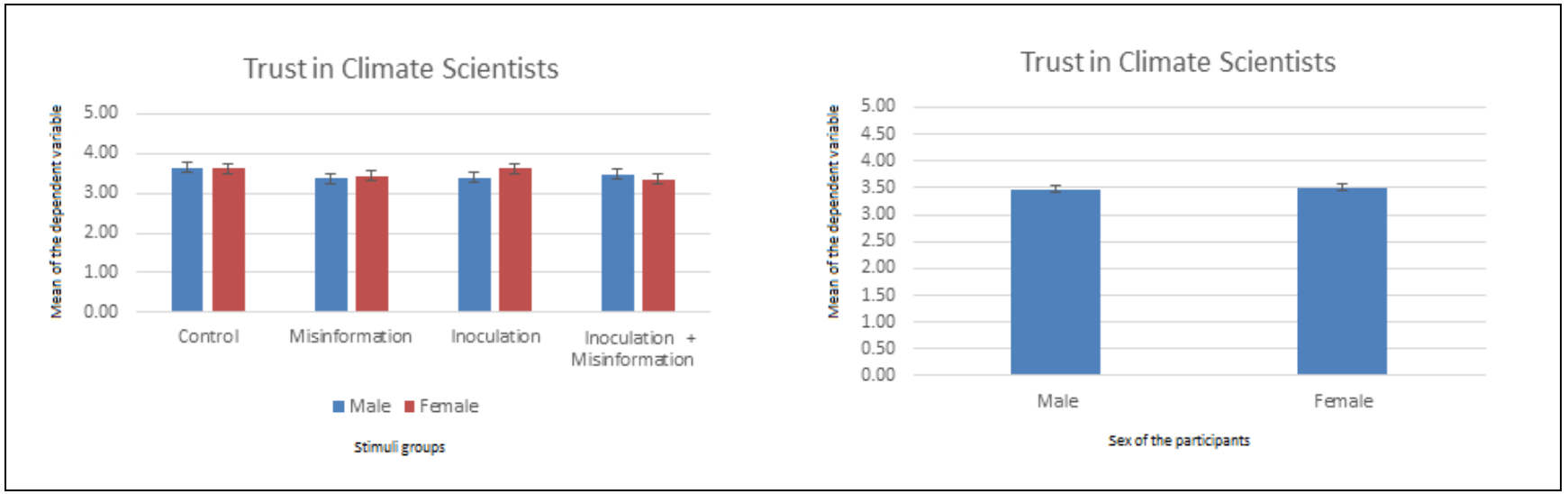
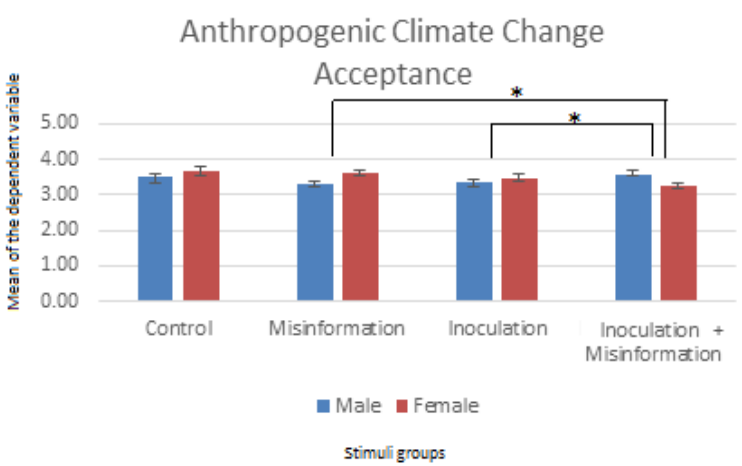
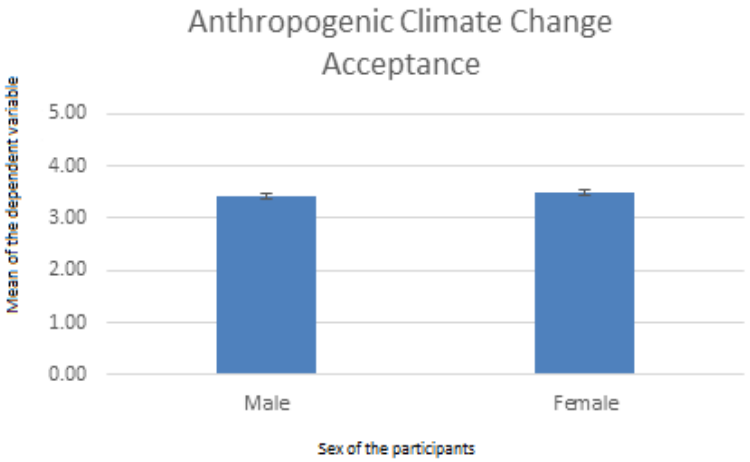
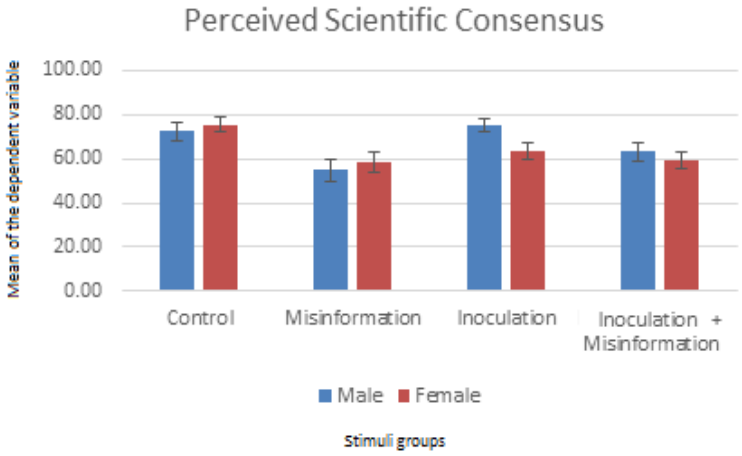


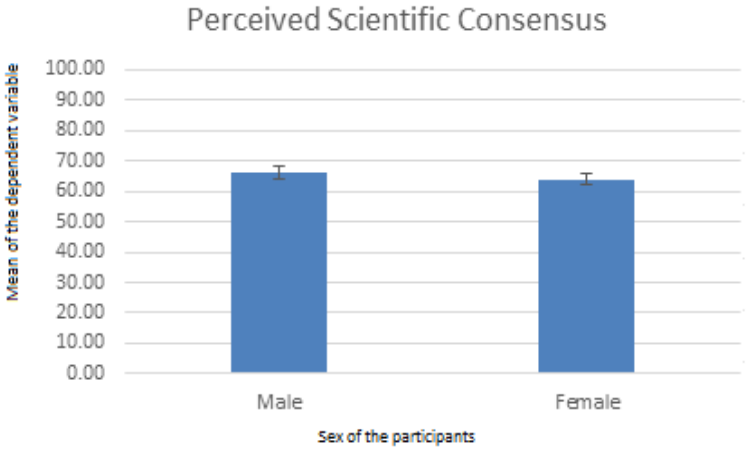
Figure 2, the effect of the study's stimuli on the dependent variables.

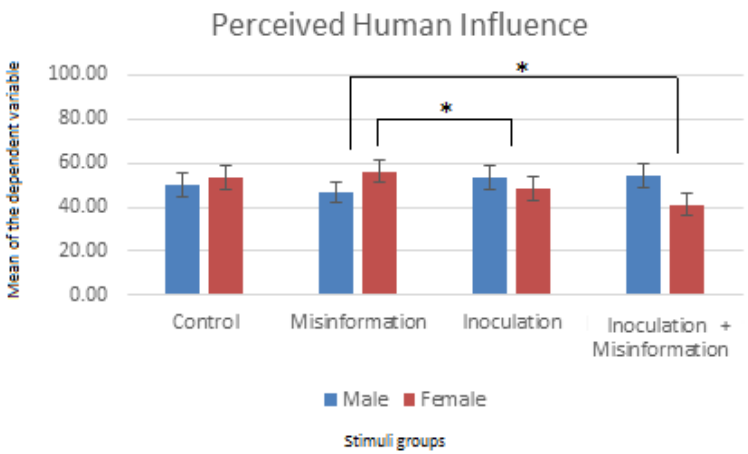


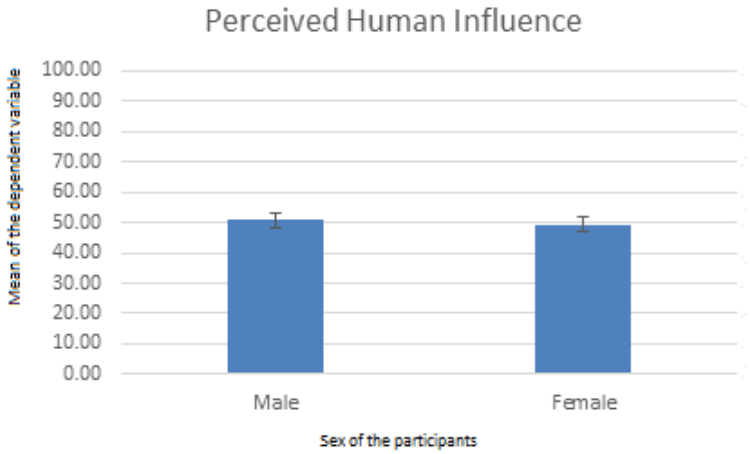

Anthropogenic Climate Change Acceptance
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
*
*
Control
Misinformation
Inoculation
Inoculation + Misinformation
Male
Female
Stimuli groups

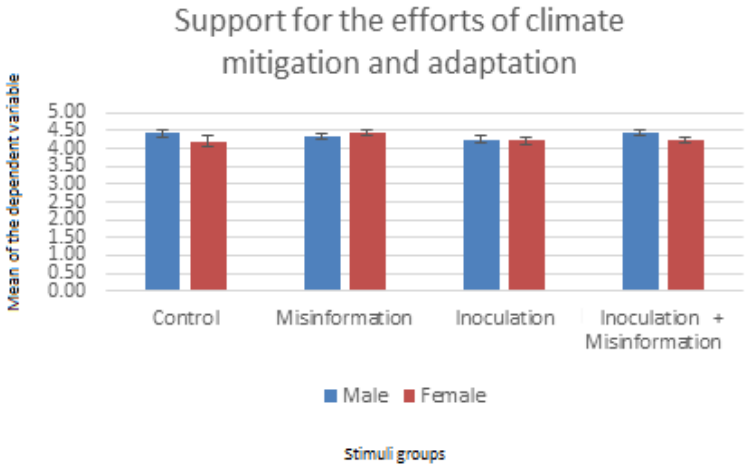

Anthropogenic Climate Change Acceptance
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
Male
Female
Sex of the participants

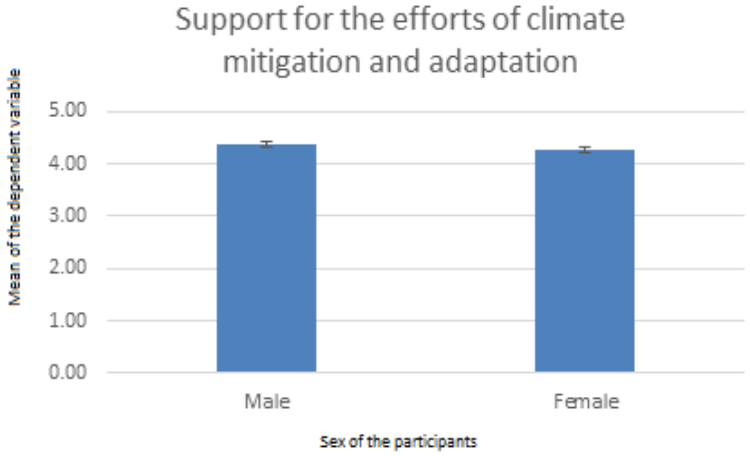

Perceived Scientific Consensus
Mean of the dependent variable
100.00
80.00
60.00
40.00
20.00
0.00
Control
Misinformation
Inoculation
Inoculation + Misinformation
Male
Female
Stimuli groups

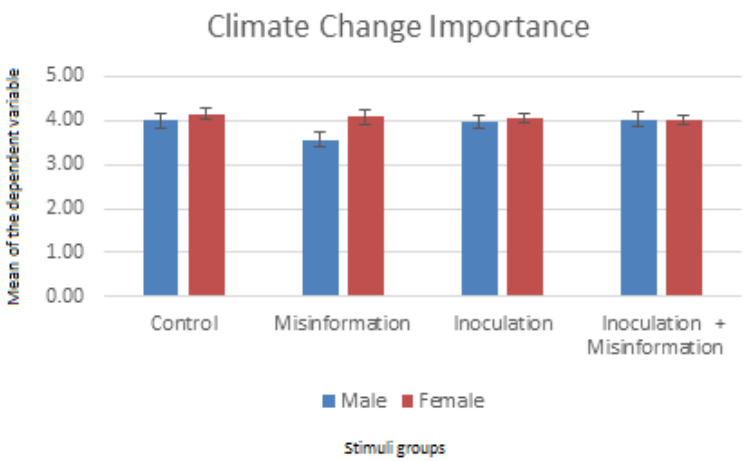

Perceived Scientific Consensus
Mean of the dependent variable
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Male
Female
Sex of the participants

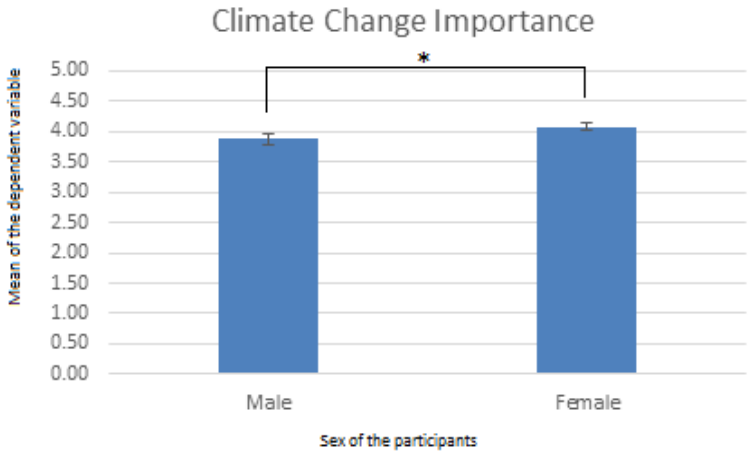

Perceived Human Influence
Mean of the dependent variable
100.00
80.00
60.00
40.00
20.00
0.00
*
*
Control
Misinformation
Inoculation
Inoculation + Misinformation
Male
Female
Stimuli groups

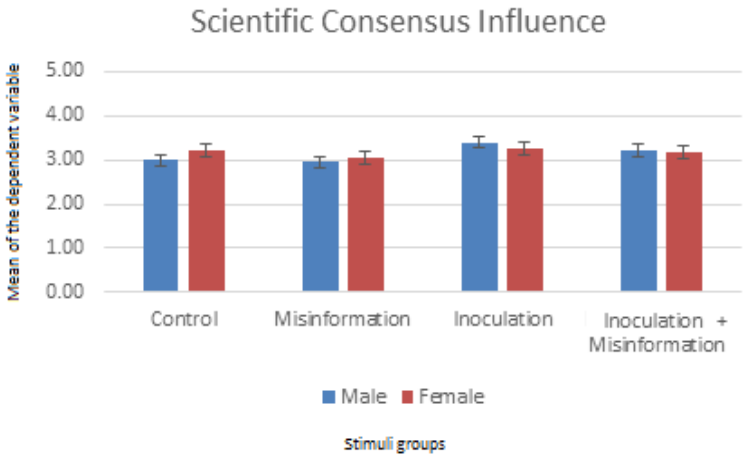

Perceived Human Influence
Mean of the dependent variable
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Male
Female
Sex of the participants

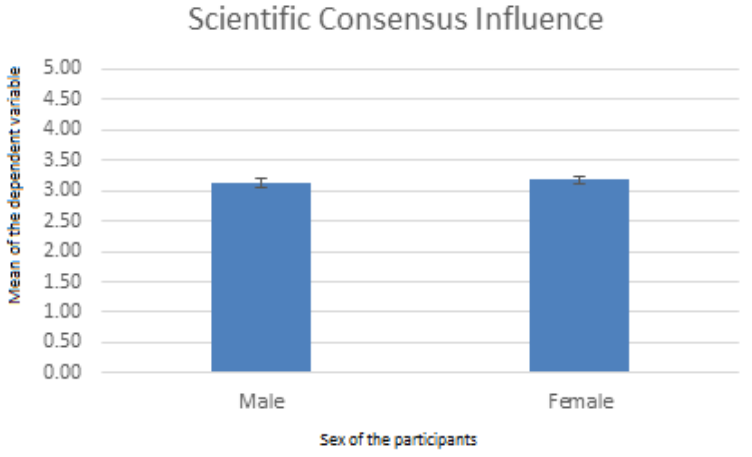

Support for the efforts of climate mitigation and adaptation
Mean of the dependent variable
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Control
Misinformation
Inoculation
Inoculation + Misinformation
Male
Female
Stimuli groups


Support for the efforts of climate mitigation and adaptation
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
Male
Female
Sex of the participants


Climate Change Importance
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
Control
Misinformation
Inoculation
Inoculation + Misinformation
Male
Female
Stimuli groups


Climate Change Importance
*
Mean of the dependent variable
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Male
Female
Sex of the participants


Scientific Consensus Influence
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
Control
Misinformation
Inoculation
Inoculation + Misinformation
Male
Female
Stimuli groups


Scientific Consensus Influence
Mean of the dependent variable
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Male
Female
Sex of the participants

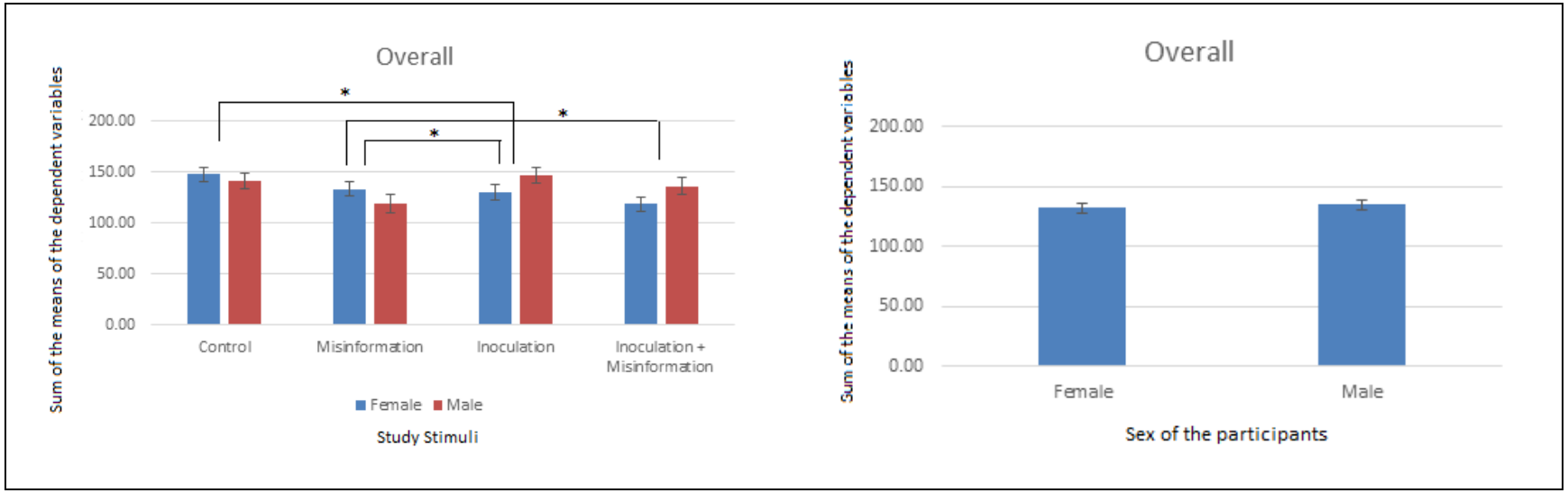
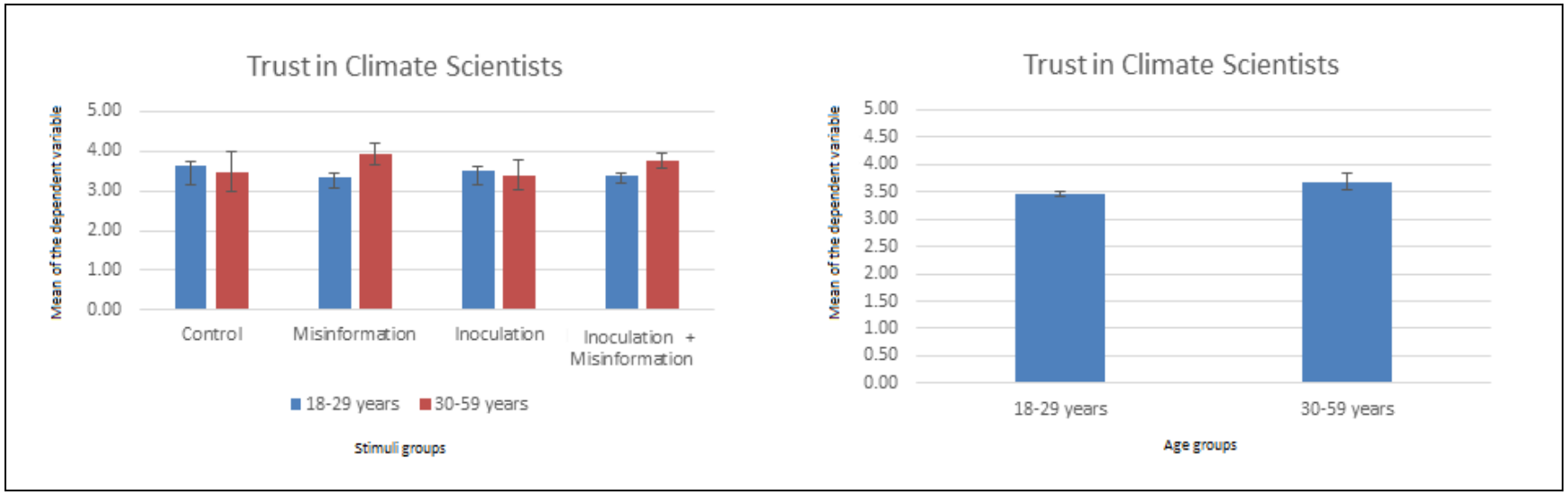
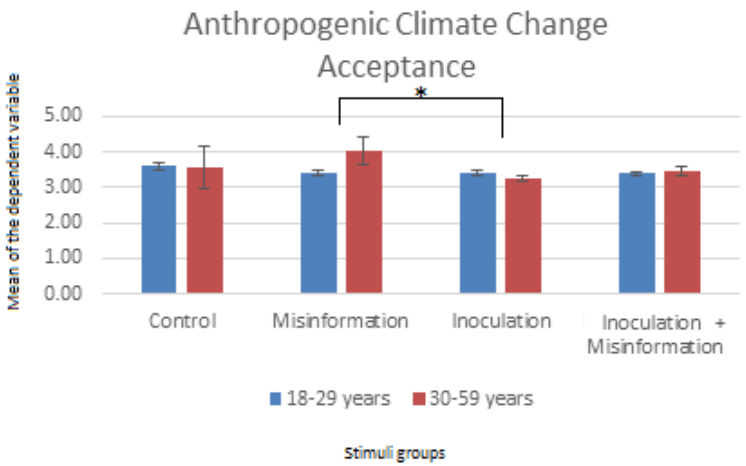
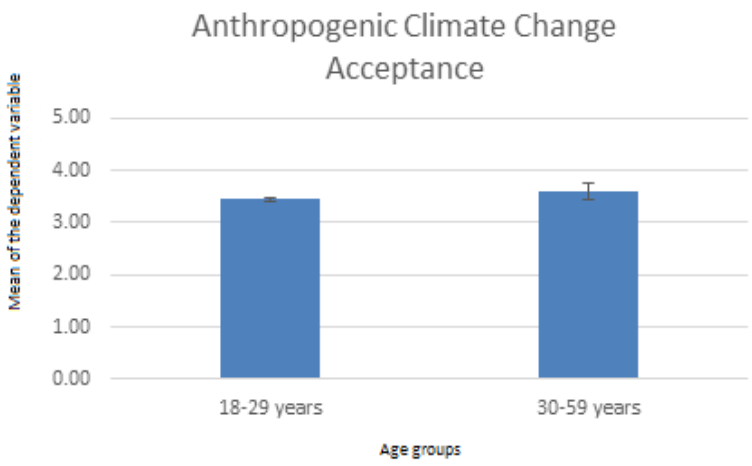
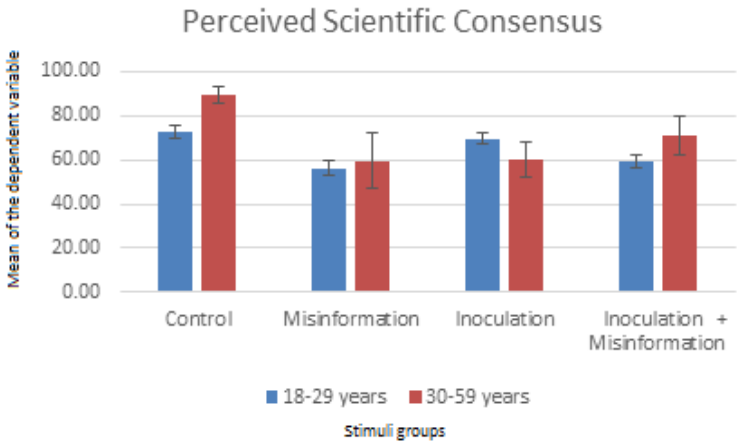


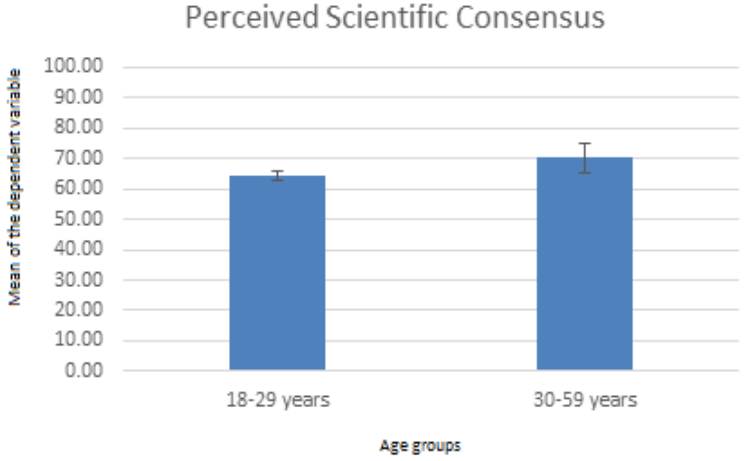
Figure 3, the effect of the difference in the sex of the participants and its interaction with the study's stimuli on the dependent variables.

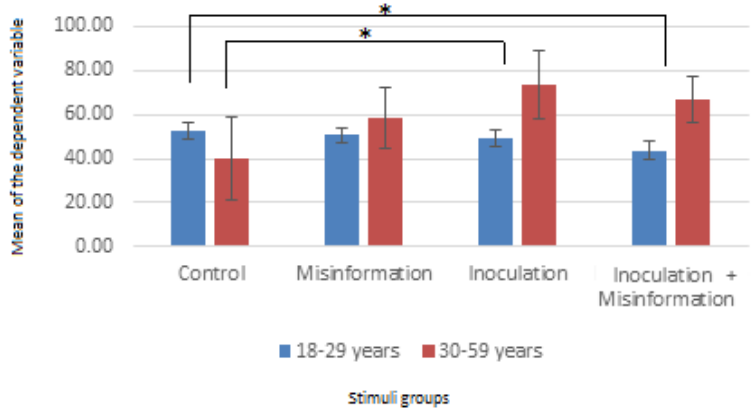


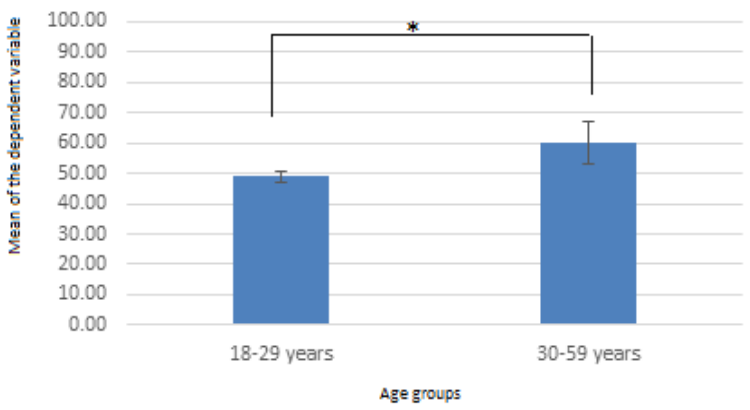

Anthropogenic Climate Change Acceptance
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
*
Control
Misinformation
Inoculation
Inoculation + Misinformation
18-29 years
30-59 years
Stimuli groups

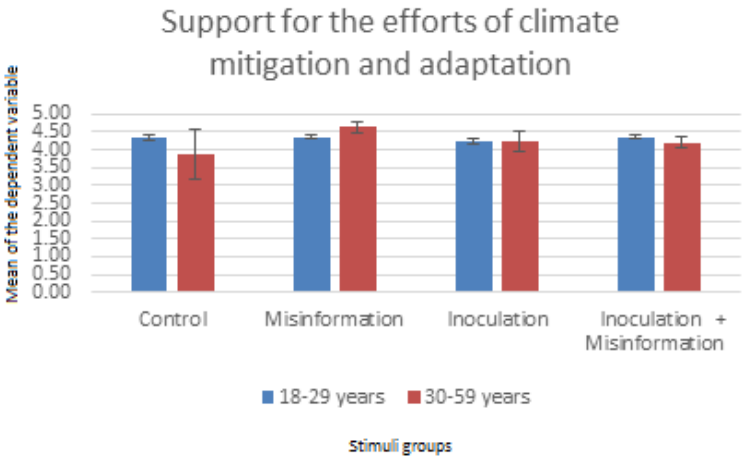

Anthropogenic Climate Change Acceptance
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
18-29 years
30-59 years
Age groups

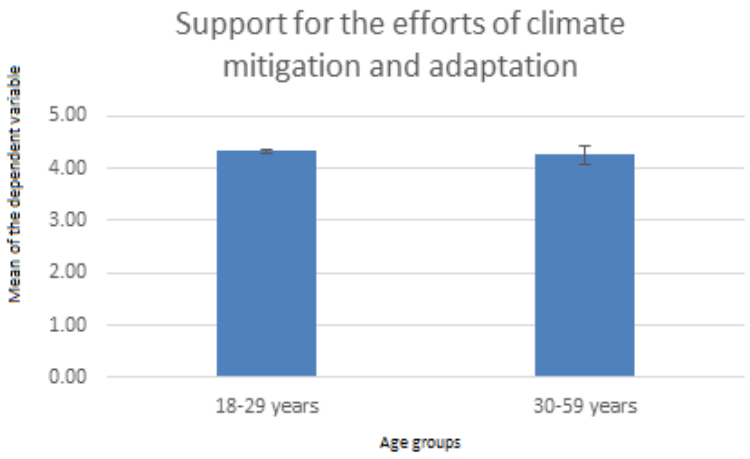

Perceived Scientific Consensus
Mean of the dependent variable
100.00
80.00
60.00
40.00
20.00
0.00
Control
Misinformation
Inoculation
Inoculation + Misinformation
18-29 years
30-59 years
Stimuli groups

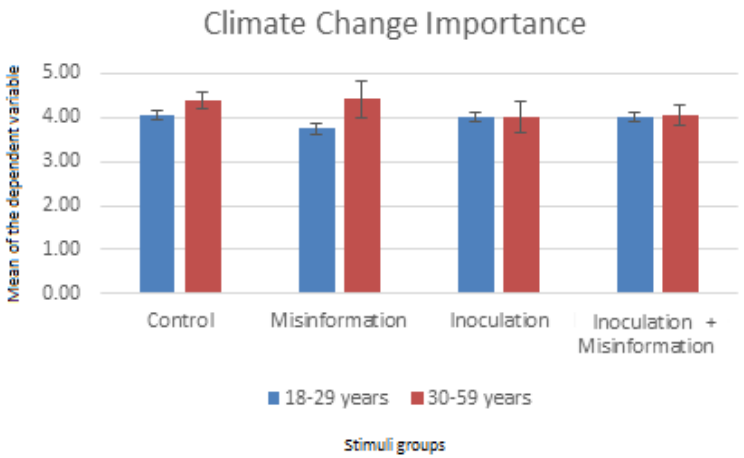

Perceived Scientific Consensus
Mean of the dependent variable
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
18-29 years
30-59 years
Age groups

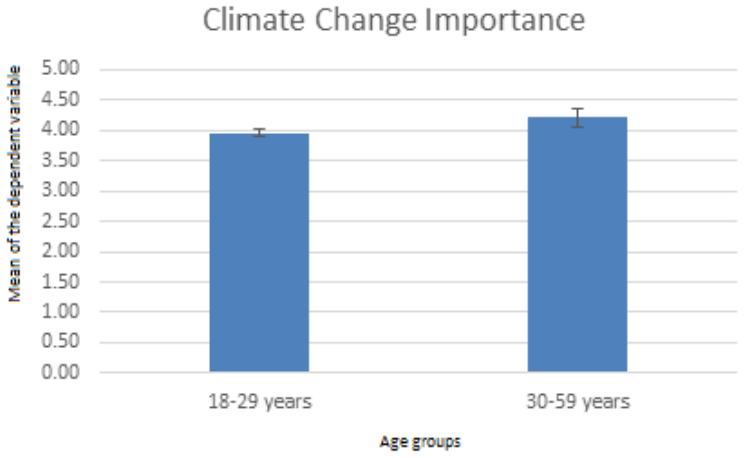

Perceived Human Influence
Mean of the dependent variable
100.00
80.00
60.00
40.00
20.00
0.00
*
*
Control
Misinformation
Inoculation
Inoculation + Misinformation
18-29 years
30-59 years
Stimuli groups

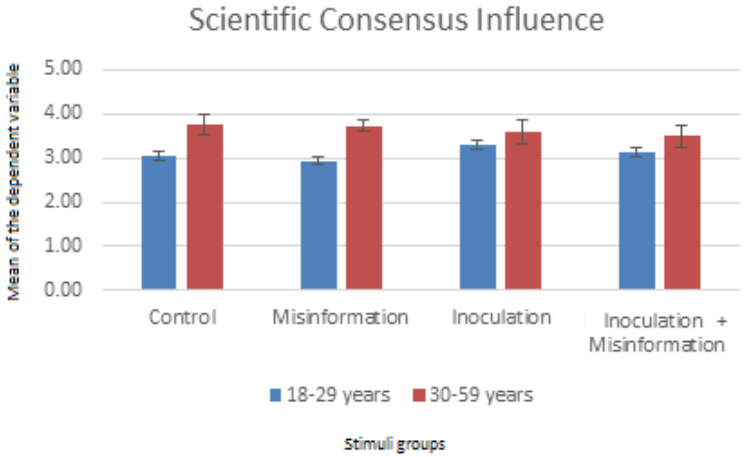

Perceived Human Influence
Mean of the dependent variable
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
*
18-29 years
30-59 years
Age groups

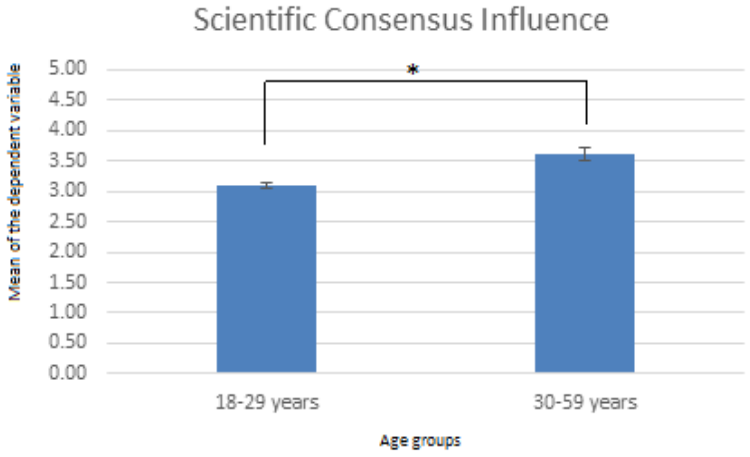

Support for the efforts of climate mitigation and adaptation
Mean of the dependent variable
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Control
Misinformation
Inoculation
Inoculation + Misinformation
18-29 years
30-59 years
Stimuli groups


Support for the efforts of climate mitigation and adaptation
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
18-29 years
30-59 years
Age groups


Climate Change Importance
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
Control
Misinformation
Inoculation
Inoculation + Misinformation
18-29 years
30-59 years
Stimuli groups


Climate Change Importance
Mean of the dependent variable
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
18-29 years
30-59 years
Age groups


Scientific Consensus Influence
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
Control
Misinformation
Inoculation
Inoculation + Misinformation
18-29 years
30-59 years
Stimuli groups


Scientific Consensus Influence
Mean of the dependent variable
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
*
18-29 years
30-59 years
Age groups

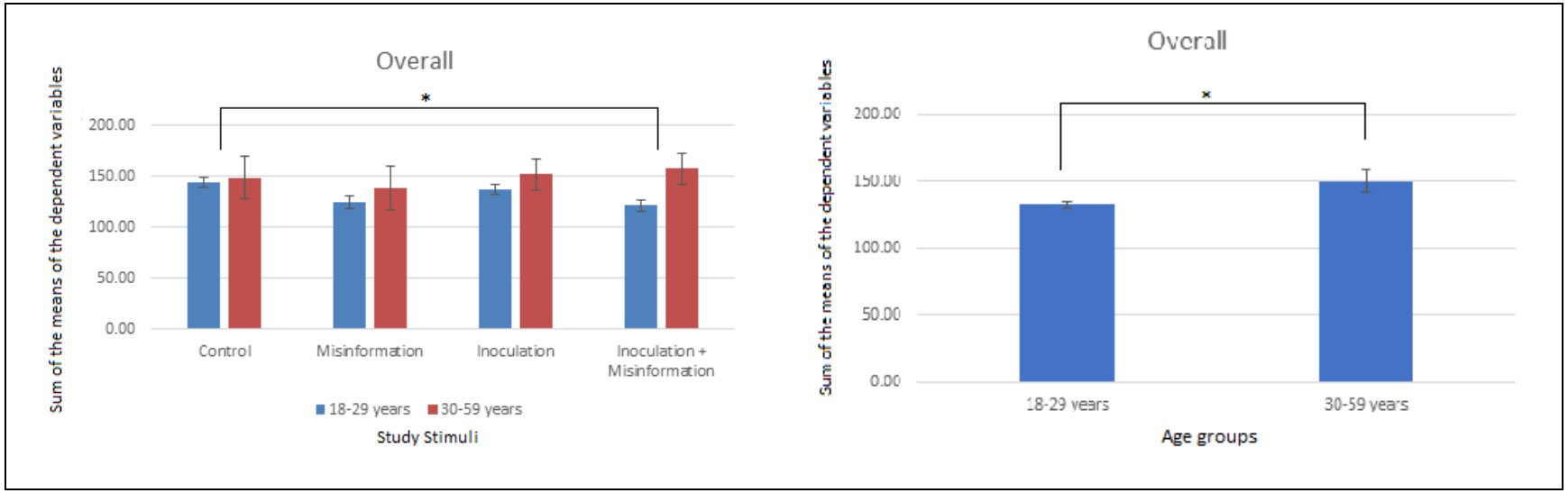
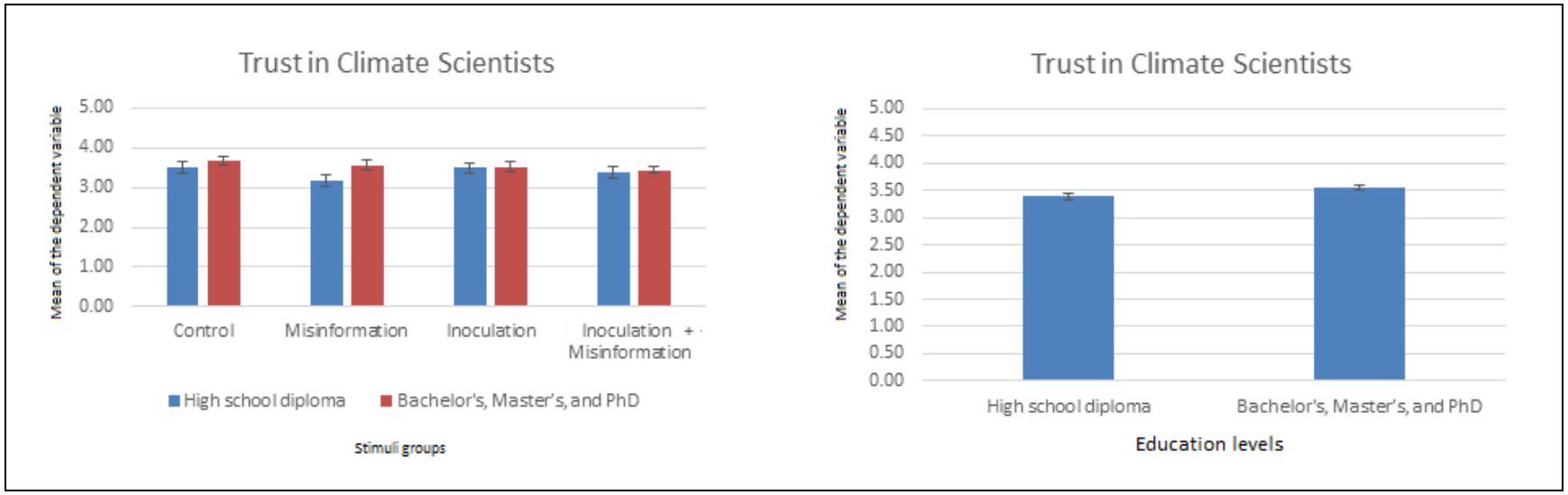
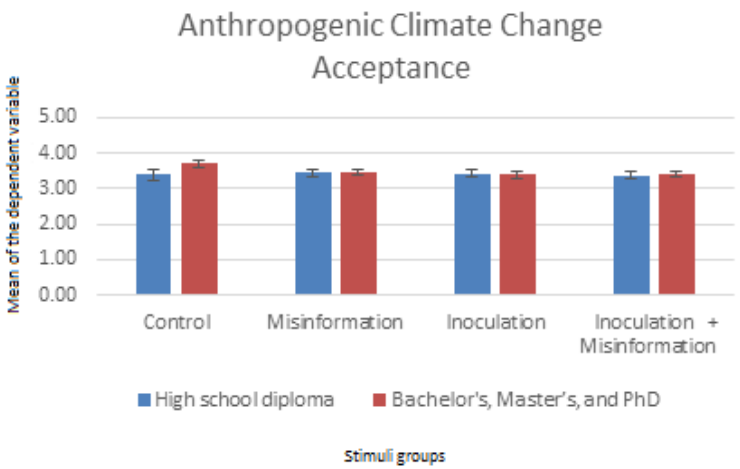
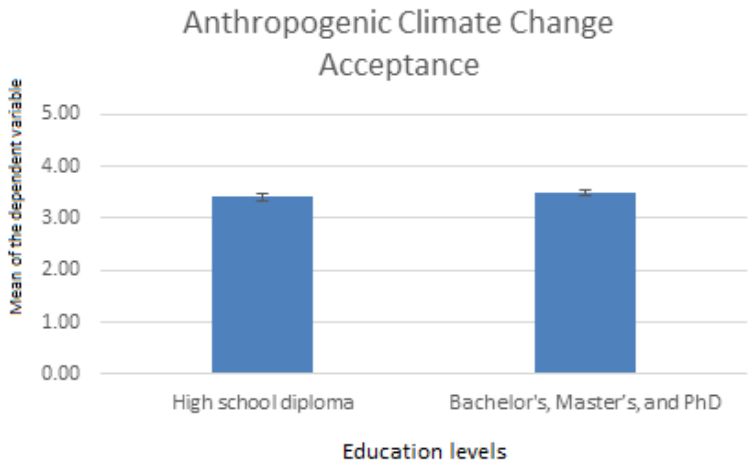
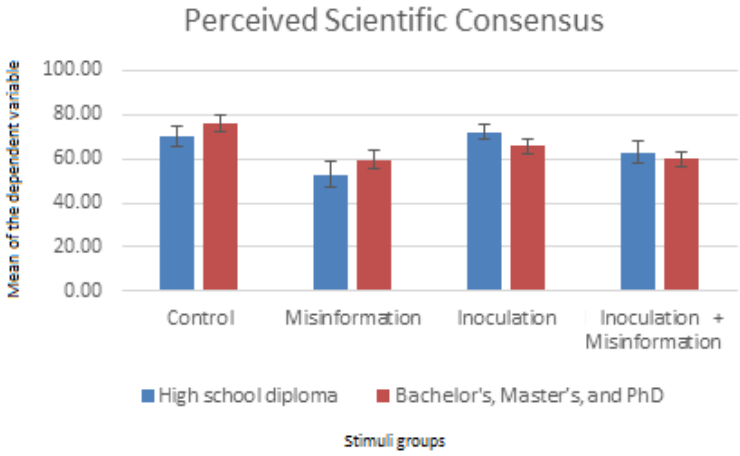


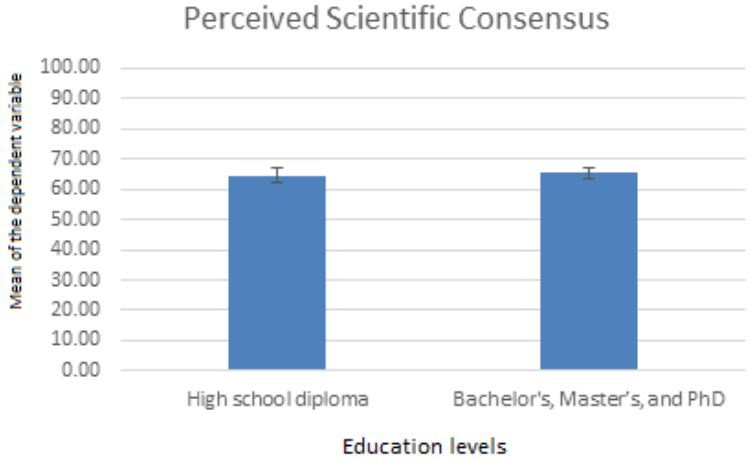
Figure 4, the effect of the difference in the age groups of the participants and its interaction with the study's stimuli on the dependent variables.

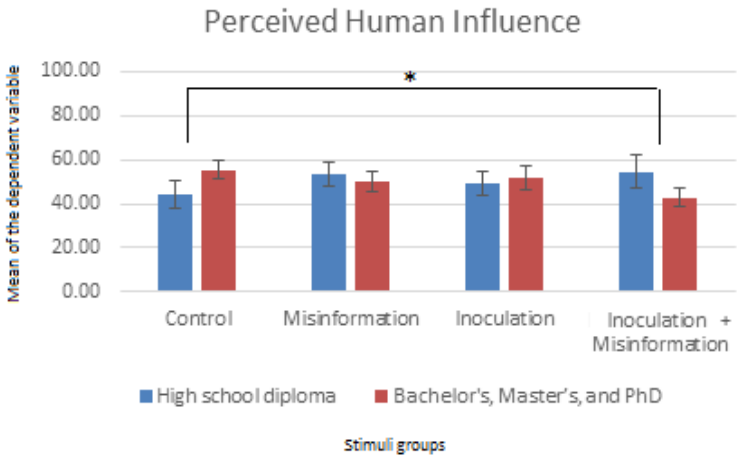


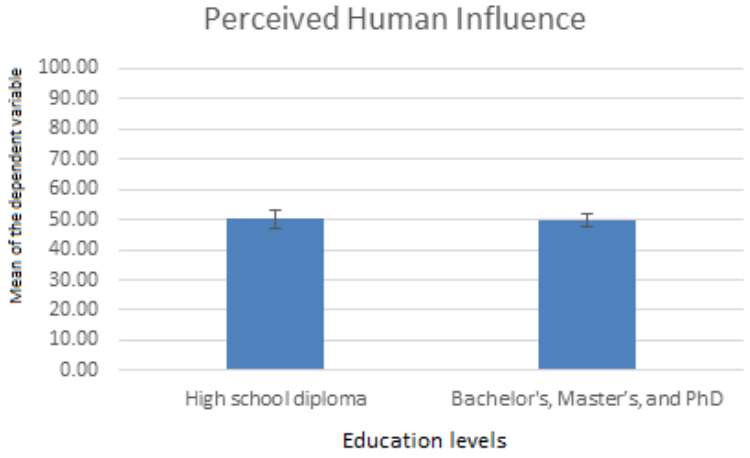

Anthropogenic Climate Change Acceptance
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
Control
Misinformation
Inoculation
Inoculation + Misinformation
High school diploma
Bachelor's, Master's, and PhD
Stimuli groups

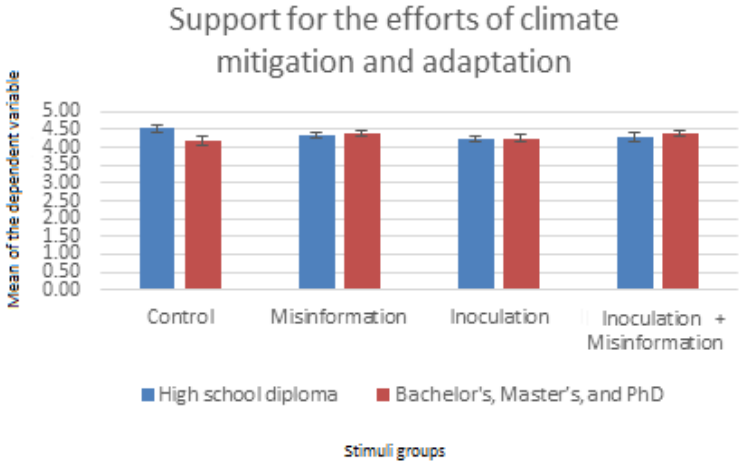

Anthropogenic Climate Change Acceptance
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
High school diploma
Bachelor's, Master's, and PhD
Education levels

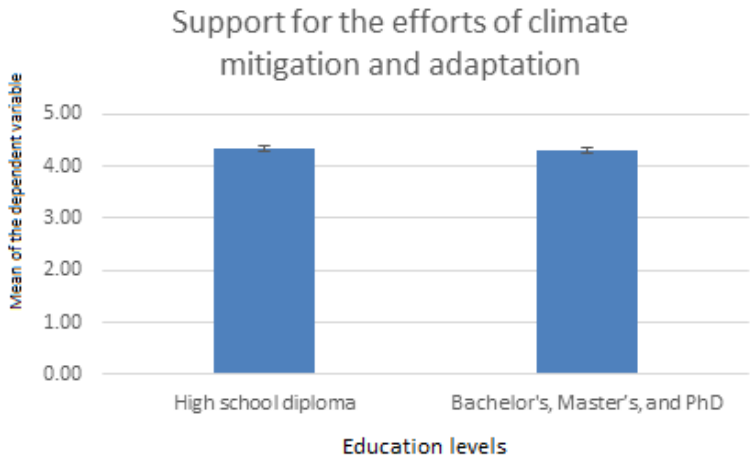

Perceived Scientific Consensus
Mean of the dependent variable
100.00
80.00
60.00
40.00
20.00
0.00
Control
Misinformation
Inoculation
Inoculation + Misinformation
High school diploma
Bachelor's, Master's, and PhD
Stimuli groups

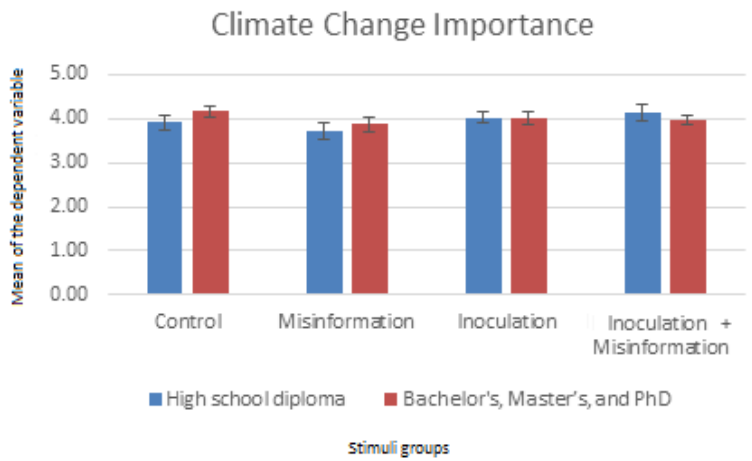

Perceived Scientific Consensus
Mean of the dependent variable
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
High school diploma
Bachelor's, Master's, and PhD
Education levels

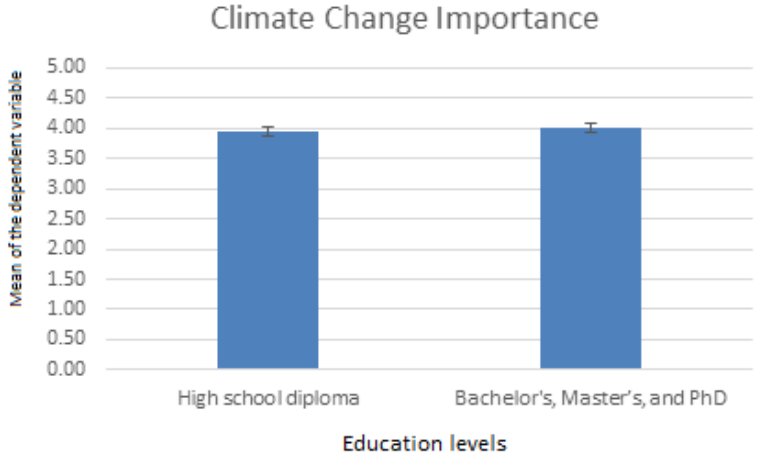

Perceived Human Influence
Mean of the dependent variable
100.00
80.00
60.00
40.00
20.00
0.00
*
Control
Misinformation
Inoculation
Inoculation + Misinformation
High school diploma
Bachelor's, Master's, and PhD
Stimuli groups

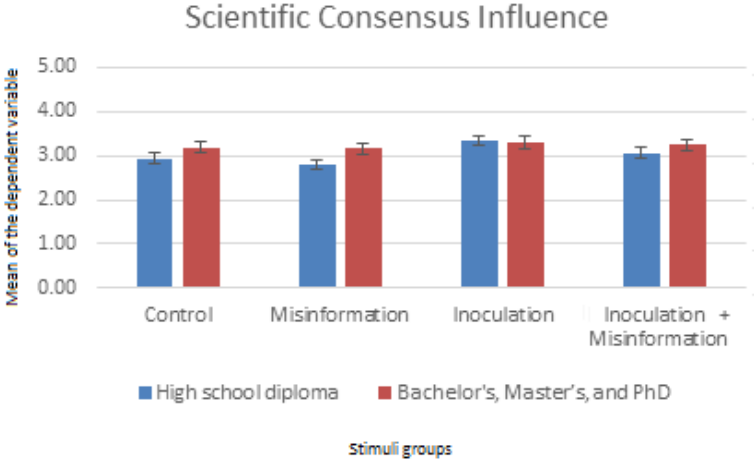

Perceived Human Influence
Mean of the dependent variable
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
High school diploma
Bachelor's, Master's, and PhD
Education levels

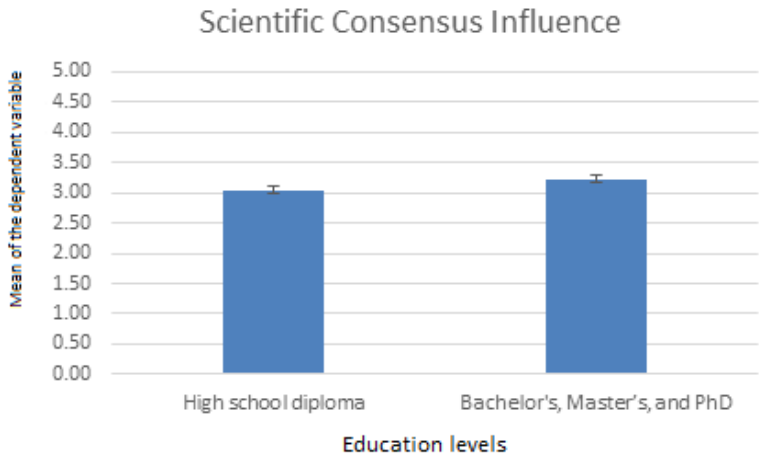

Support for the efforts of climate mitigation and adaptation
Mean of the dependent variable
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Control
Misinformation
Inoculation
Inoculation + Misinformation
High school diploma
Bachelor's, Master's, and PhD
Stimuli groups


Support for the efforts of climate mitigation and adaptation
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
High school diploma
Bachelor's, Master's, and PhD
Education levels


Climate Change Importance
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
Control
Misinformation
Inoculation
Inoculation + Misinformation
High school diploma
Bachelor's, Master's, and PhD
Stimuli groups


Climate Change Importance
Mean of the dependent variable
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
High school diploma
Bachelor's, Master's, and PhD
Education levels


Scientific Consensus Influence
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
Control
Misinformation
Inoculation
Inoculation + Misinformation
High school diploma
Bachelor's, Master's, and PhD
Stimuli groups


Scientific Consensus Influence
Mean of the dependent variable
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
High school diploma
Bachelor's, Master's, and PhD
Education levels

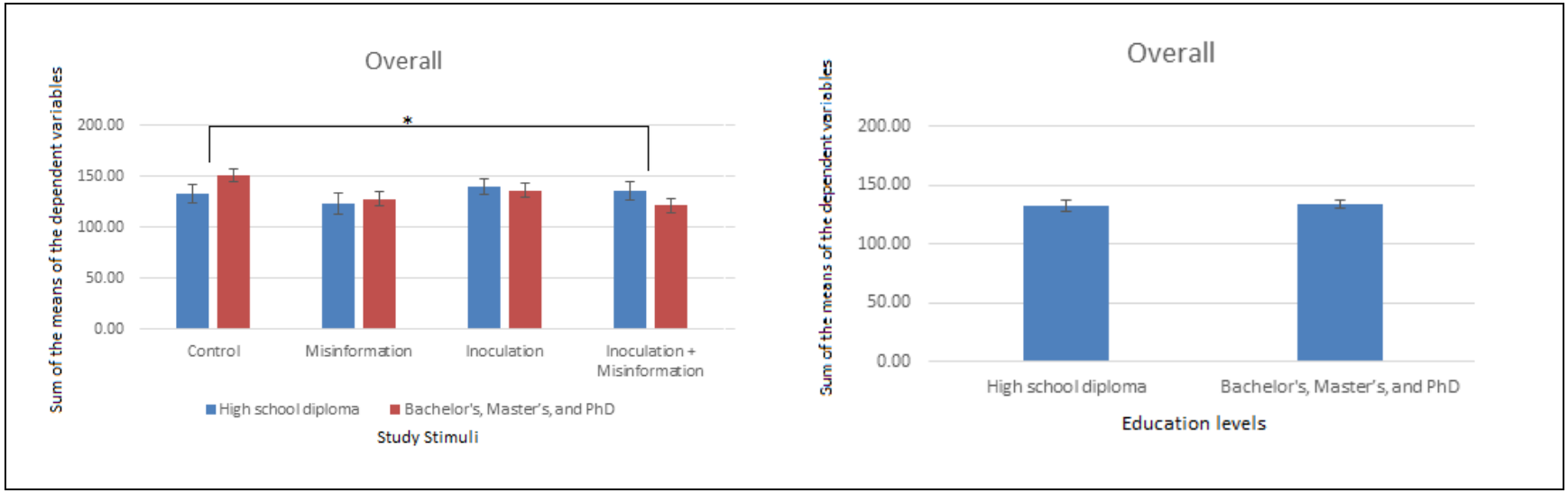
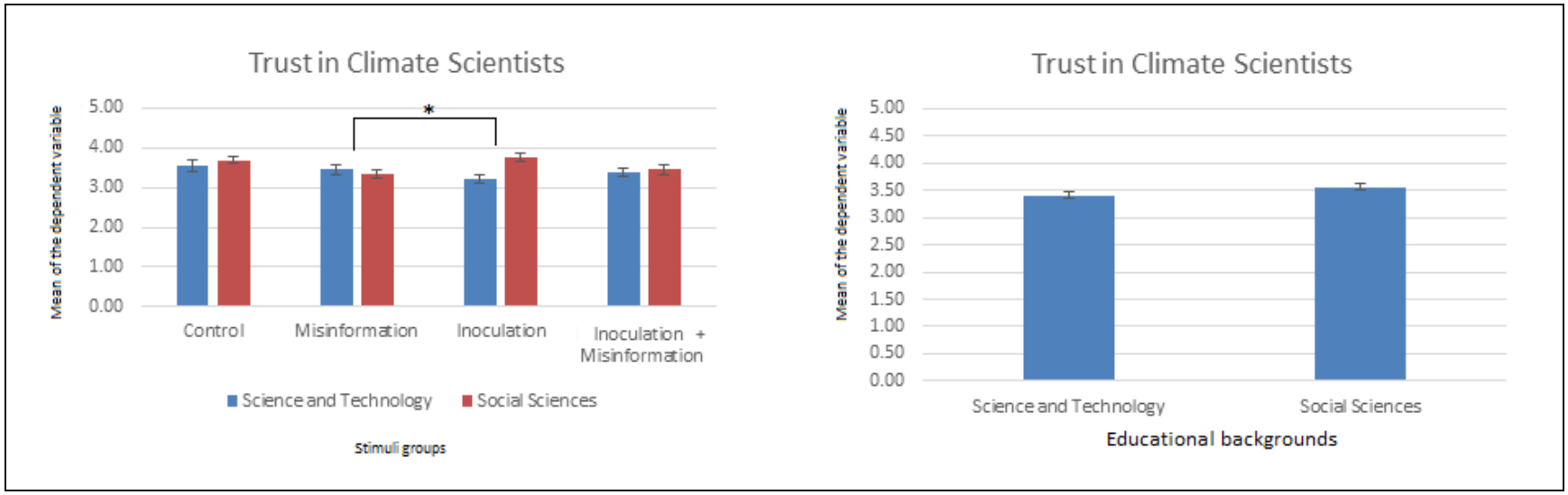
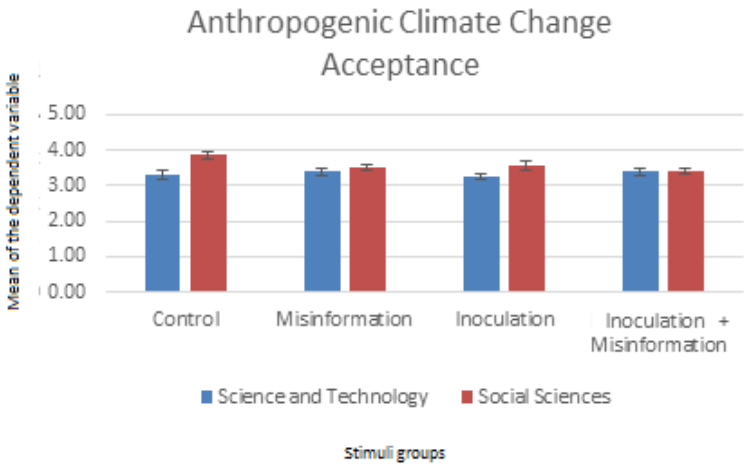
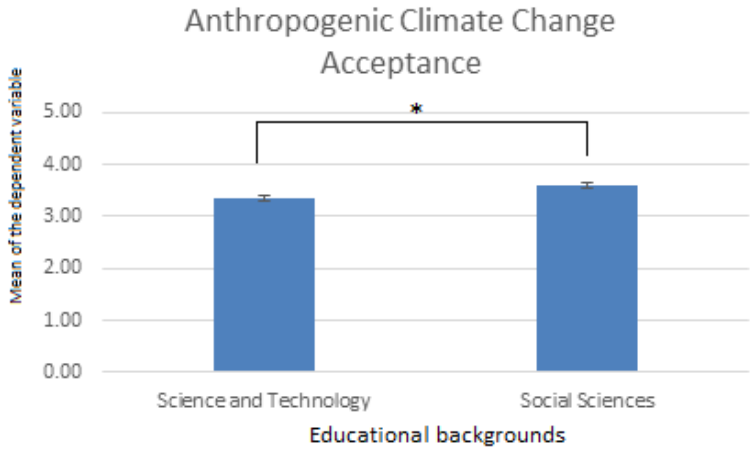
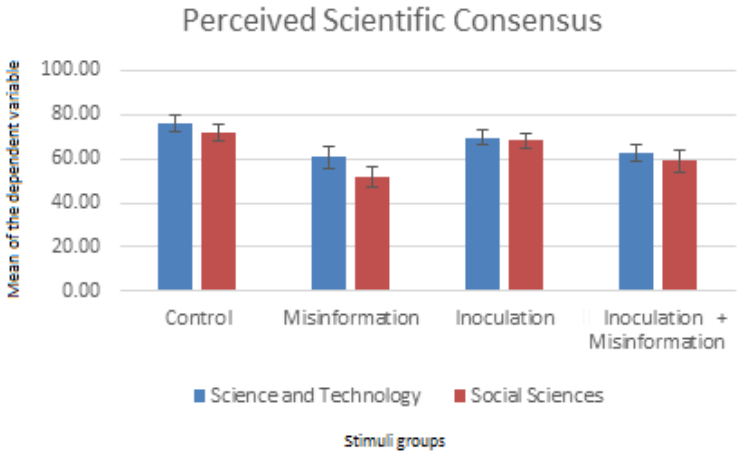


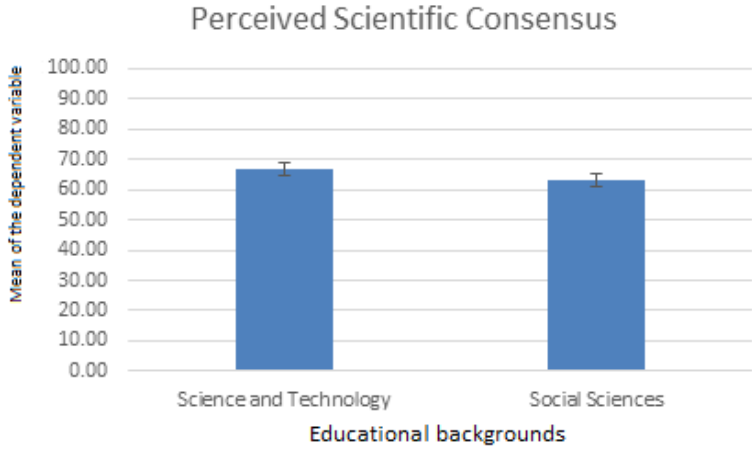
Figure 5, the effect of the difference in the education level of the participants and its interaction with the study's stimuli on the dependent variables.

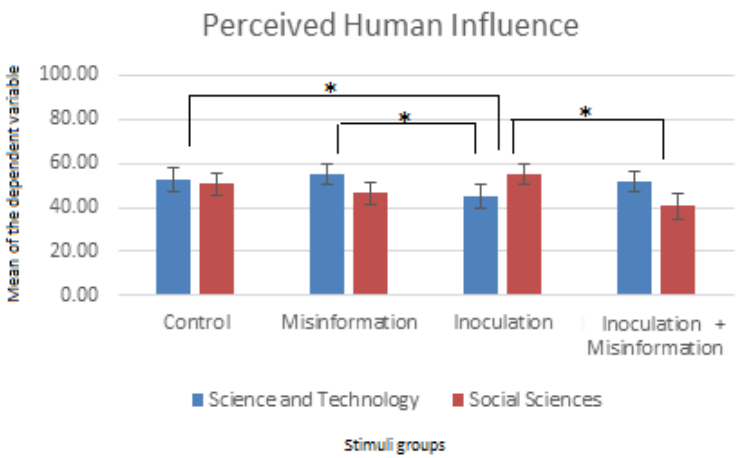


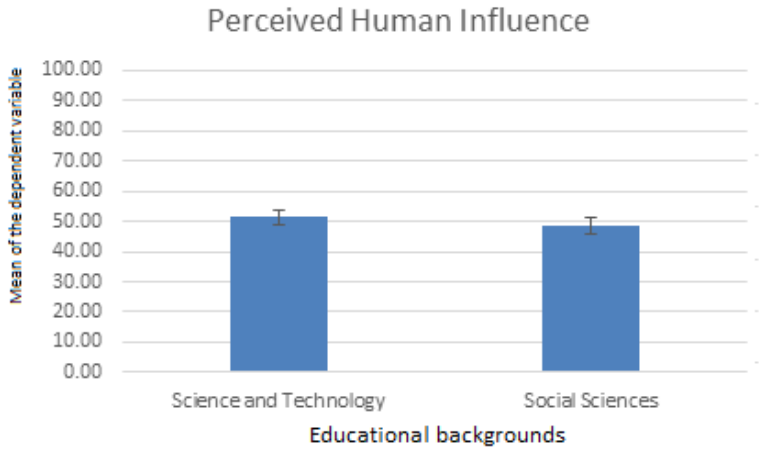

Anthropogenic Climate Change Acceptance
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
Control
Misinformation
Inoculation
Inoculation + Misinformation
Science and Technology
Social Sciences
Stimuli groups

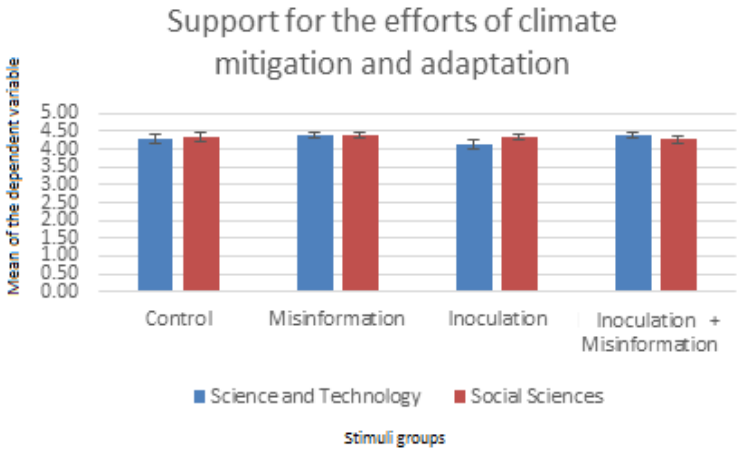

Anthropogenic Climate Change Acceptance
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
*
Science and Technology
Social Sciences
Educational backgrounds

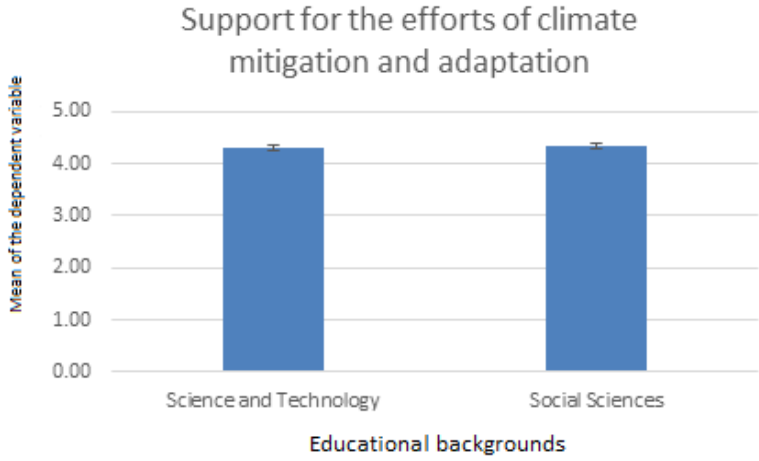

Perceived Scientific Consensus
Mean of the dependent variable
100.00
80.00
60.00
40.00
20.00
0.00
Control
Misinformation
Inoculation
Inoculation + Misinformation
Science and Technology
Social Sciences
Stimuli groups

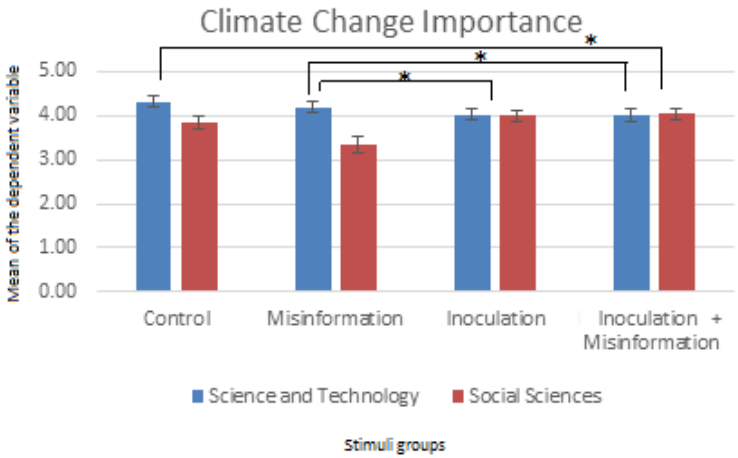

Perceived Scientific Consensus
Mean of the dependent variable
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Science and Technology
Social Sciences
Educational backgrounds

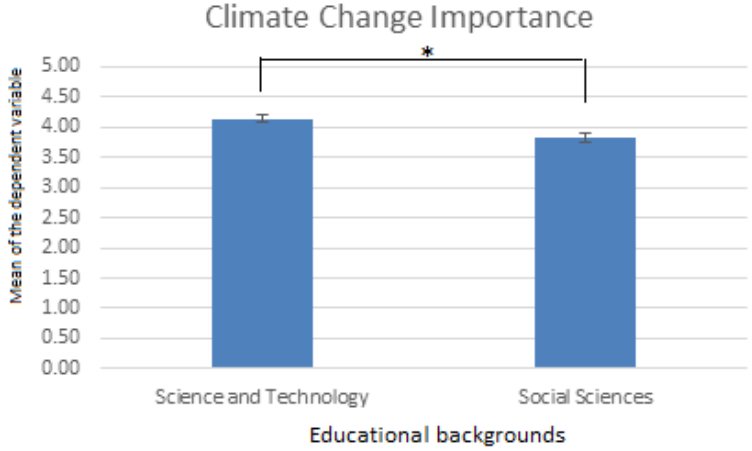

Perceived Human Influence
Mean of the dependent variable
100.00
80.00
60.00
40.00
20.00
0.00
*
*
*
Control
Misinformation
Inoculation
Inoculation + Misinformation
Science and Technology
Social Sciences
Stimuli groups

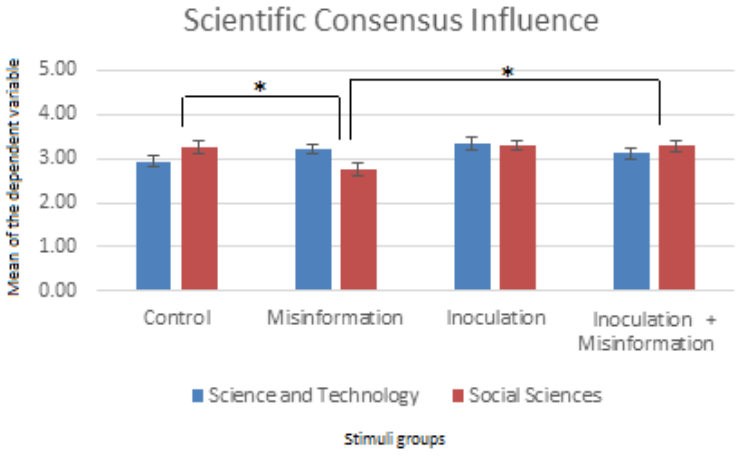

Perceived Human Influence
Mean of the dependent variable
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Science and Technology
Social Sciences
Educational backgrounds

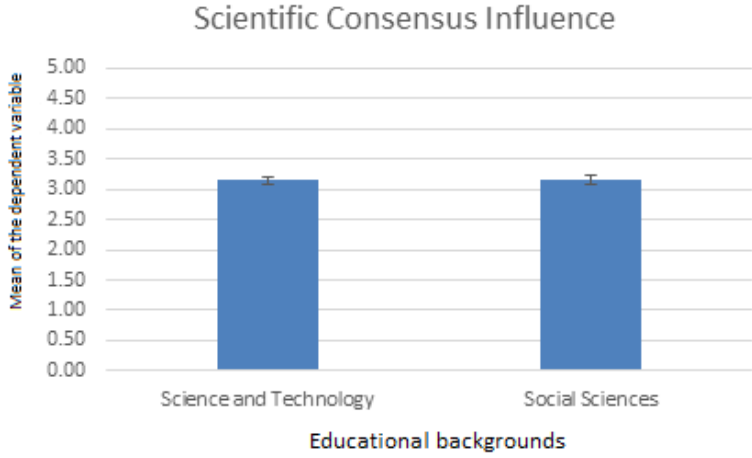

Support for the efforts of climate mitigation and adaptation
Mean of the dependent variable
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Control
Misinformation
Inoculation
Inoculation + Misinformation
Science and Technology
Social Sciences
Stimuli groups


Support for the efforts of climate mitigation and adaptation
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
Science and Technology
Social Sciences
Educational backgrounds


Climate Change Importance
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
*
*
*
Control
Misinformation
Inoculation
Inoculation + Misinformation
Science and Technology
Social Sciences
Stimuli groups


Climate Change Importance
Mean of the dependent variable
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
*
Science and Technology
Social Sciences
Educational backgrounds


Scientific Consensus Influence
Mean of the dependent variable
5.00
4.00
3.00
2.00
1.00
0.00
*
*
Control
Misinformation
Inoculation
Inoculation + Misinformation
Science and Technology
Social Sciences
Stimuli groups


Scientific Consensus Influence
Mean of the dependent variable
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Science and Technology
Social Sciences
Educational backgrounds

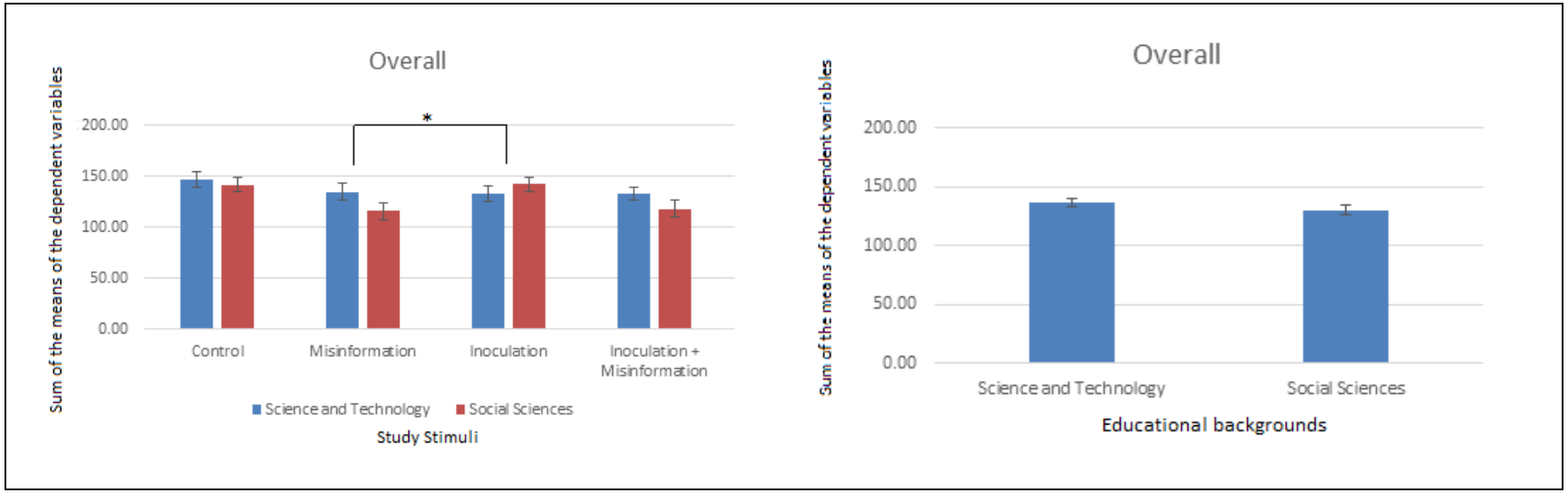


Figure 6, the effect of the difference in the educational backgrounds of the participants and its interaction with the study's stimuli on the dependent variables.

Chapter 4

Discussion

The aim of this study was to test the effect of misinformation on the public perception of the scientific consensus on climate change and the effect on climate-related attitudes. The study also aimed at testing if inoculation can have a neutralizing effect on the misinformation's influence. The data analyses were performed to test the main effects of the study stimuli and the demographic variables on the dependent variables. Also, the data analyses were performed to test the effect of the interactions between the study stimuli and the demographic variables on the dependent variables.

The analyses of the main effects of the difference between the study's stimuli showed some significant results. It was found from Table 2 and Table 7 that the difference between the study's different stimuli (control, misinformation, inoculation, inoculation + misinformation) had a significant main effect on the Perceived Scientific Consensus dependent variable. From the Tukey post hoc test (Table 8), it was found that there were significant differences in the mean values of the Perceived Scientific Consensus dependent variable between the control group and the misinformation stimulus group, between the control group and the inoculation + misinformation stimulus group, and between the misinformation stimulus group and the inoculation stimulus group. It was found from Table 2 and Table 11 that the difference between the inoculation + misinformation stimulus and the control group had a significant main effect on the Perceived Scientific Consensus dependent variable. Also, it was found that the mean value of the Perceived Scientific Consensus dependent variable of the inoculation + misinformation stimulus was lower than the control group. It was found from Table 2 and Table 9 that the difference between the misinformation stimulus and the control group had a significant main effect on the Perceived Scientific Consensus dependent variable. Also, it was found that the mean value of the Perceived Scientific Consensus dependent variable of the misinformation stimulus was lower than the control group. This shows that both the misinformation stimulus and the inoculation + misinformation stimulus decreased the Perceived Scientific Consensus significantly in comparison to the control group's mean value. However, coupling inoculation with misinformation resulted in less decrease from the control's mean value than the decrease

resulting from the misinformation-only stimulus. It was found from Table 2 and Table 12 that the difference between the inoculation stimulus and the misinformation stimulus had a significant main effect on the Perceived Scientific Consensus dependent variable. Also, it was found that the mean value of the Perceived Scientific Consensus dependent variable of the misinformation stimulus was lower than the inoculation stimulus. The inoculation-only stimulus mean value was less than the control's mean value, but not significantly. Additionally, when comparing the effect of the inoculation-only stimulus and the effect of the inoculation + misinformation stimulus, it was found that the difference is insignificant. The effect of the inoculation-only was significantly higher than the misinformation-only effect. Therefore, the inoculation did not decrease the Perceived Scientific Consensus significantly, and when presented before the misinformation can have a neutralizing effect but not significantly. It was found from Table 2 and Table 12 that the difference between the inoculation stimulus and the misinformation stimulus had a significant main effect on the Scientific Consensus Influence dependent variable. Also, it was found that the mean value of the Scientific Consensus Influence dependent variable of the misinformation stimulus was lower than the inoculation stimulus. This shows that there is a negative effect of misinformation on the Scientific Consensus Influence dependent variables and that inoculation can neutralize this negative effect. The results of this study confirm that misinformation can undermine the public perception of the scientific consensus. However, it was also found that this negative effect of misinformation can be lessened by inoculation. This finding is in line with a previous similar study conducted by Cook et al. (2017) where they found that inoculation can neutralize the negative effect of misinformation.

Additionally, it was found from Table 2 and Table 7 that the difference between the study's different stimuli had a significant main effect on the "Overall". It was found from Table 2 and Table 9 that the difference between the misinformation stimulus and the control had a significant main effect on the "Overall". Also, it was found that the value of the "Overall" in the misinformation stimulus group was lower than the control group. It was found from Table 2 and Table 11 that the difference between the inoculation + misinformation stimulus and the control had a significant main effect on the "Overall". Also, it was found that the value of the "Overall" in the inoculation + misinformation stimulus group was lower than in the control group.

Unlike previous similar studies conducted by Cook et al. (2017) and Schmid-Petri & Bürger (2022), which focused on investigating economic and political views as intervening factors, this

study investigated demographic variables as intervening factors instead. The analyses of the main effects of the difference in the sex of the participants and its interactions with the study's different stimuli showed some significant results. It was found from Table 3 and Table 12 that the difference between the sexes of the participants had a significant main effect on the Anthropogenic Climate Change Acceptance dependent variable between the inoculation stimulus group and the misinformation stimulus group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Anthropogenic Climate Change Acceptance dependent variable of the male participants were lower in both stimuli groups combined in comparison to the female participants. It was found from Table 3 and Table 7 that the difference between the study's stimuli and the difference between the sexes of the participants had a significant interaction on the Anthropogenic Climate Change Acceptance dependent variable. It was found from Table 3 and Table 13 that the difference between the misinformation stimulus and the inoculation + misinformation stimulus and the difference between the sexes of the participants had a significant interaction on the Anthropogenic Climate Change Acceptance dependent variable. Also, it was found that the mean value of the Anthropogenic Climate Change Acceptance dependent variable of the female participants in the inoculation + misinformation stimulus group decreased in comparison to their misinformation stimulus group while it increased for the male participants. It was found from Table 3 and Table 14 that the difference between the inoculation stimulus and the inoculation + misinformation stimulus and the difference between the sexes of the participants had a significant interaction on the Anthropogenic Climate Change Acceptance dependent variable. Also, it was found that the mean value of the Anthropogenic Climate Change Acceptance dependent variable of the female participants in the inoculation + misinformation stimulus group decreased in comparison to their inoculation stimulus group while it increased for the male participants. This shows that the inoculation + misinformation stimulus was only effective for the male participants in neutralizing the misinformation effect regarding the Anthropogenic Climate Change Acceptance dependent variable. It was found from Table 3 and Table 14 that the difference between the sexes of the participants had a significant main effect on the Perceived Scientific Consensus dependent variable between the inoculation stimulus group and the inoculation + misinformation stimulus group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Perceived Scientific Consensus dependent variable of the male participants were

higher in both stimuli groups combined in comparison to the female participants. It was found from Table 3 and Table 14 that the difference between the sexes of the participants had a significant main effect on the Perceived Human Influence dependent variable between the inoculation stimulus group and the inoculation + misinformation stimulus group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Perceived Human Influence dependent variable of the male participants were higher in both stimuli groups combined in comparison to the female participants. It was found from Table 3 and Table 7 that the difference between the study's stimuli and the difference between the sexes of the participants had a significant interaction on the Perceived Human Influence dependent variable. It was found from Table 3 and Table 12 that the difference between the inoculation stimulus and the misinformation stimulus and the difference between the sexes of the participants had a significant interaction on the Perceived Human Influence dependent variable. Also, it was found that the mean value of the Perceived Human Influence dependent variable of the female participants in the inoculation stimulus group decreased in comparison to their misinformation stimulus group while it increased for the male participants. It was found from Table 3 and Table 13 that the difference between the misinformation stimulus and the inoculation + misinformation stimulus and the difference between the sexes of the participants had a significant interaction on the Perceived Human Influence dependent variable. Also, it was found that the mean value of the Perceived Human Influence dependent variable of the female participants in the inoculation + misinformation stimulus group decreased in comparison to their misinformation stimulus group while it increased for the male participants. This shows that both the inoculation-only stimulus and the inoculation + misinformation stimulus were only effective for the male participants in neutralizing the misinformation effect regarding the Perceived Human Influence dependent variable. It was found from Table 3 and Table 7 that the difference between the sexes of the participants had a significant main effect on the Climate Change Importance dependent variable independently from the effects of the study's stimuli. Also, it was found that the aggregated mean value of the Climate Change Importance dependent variable of the female participants was higher than that of the male participants. This shows that the female participants considered climate change as an important topic more than the male participants did. It was found from Table 3 and Table 9 that the difference between the sexes of the participants had a significant main effect on the Climate Change Importance dependent variable between the misinformation

stimulus group and the control group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Climate Change Importance dependent variable of the male participants were lower in both stimuli groups combined in comparison to the female participants. It was found from Table 3 and Table 12 that the difference between the sexes of the participants had a significant main effect on the Climate Change Importance dependent variable between the inoculation stimulus group and the misinformation stimulus group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Climate Change Importance dependent variable of the male participants were lower in both stimuli groups combined in comparison to the female participants. It was found from Table 3 and Table 13 that the difference between the sexes of the participants had a significant main effect on the Climate Change Importance dependent variable between the misinformation stimulus group and the inoculation + misinformation stimulus group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Climate Change Importance dependent variable of the male participants were lower in both stimuli groups combined in comparison to the female participants. The main effects of the difference in the sex of the participants were that the female participants had higher acceptance that climate change is anthropogenic and had a higher interest in climate change as an important topic while the male participants had a higher perception of the scientific consensus and higher perception of the human influence on the climate change. The interactions between the difference in the sex of the participants and the study's stimuli were that the inoculation + misinformation stimulus was effective in neutralizing the misinformation of Anthropogenic Climate Change Acceptance dependent variable and Perceived Human Influence dependent variable for the male participants only. This study's results confirm that females have a higher concern about climate change than males which is in line with previously conducted research by Finucane et al. (2000) that there is a gap between females and males regarding environmental concerns (Finucane et al., 2000). However, this study's results also showed that males are more aware of the human influence on climate change and have a higher perception of the scientific consensus.

Additionally, it was found from Table 3 and Table 7 that the difference between the study's stimuli groups and the difference between the sexes of the participants had a significant interaction on the "Overall". It was found from Table 3 and Table 10 that the difference between the inoculation stimulus and the control and the difference between the sexes of the participants

had a significant interaction on the "Overall". Also, it was found that the value of the "Overall" of the male participants in the inoculation stimulus group increased in comparison to their control group while it decreased for the female participants. It was found from Table 3 and Table 12 that the difference between the inoculation stimulus and the misinformation stimulus and the difference between the sexes of the participants had a significant interaction on the "Overall". Also, it was found that the value of the "Overall" of the male participants in the inoculation stimulus group increased in comparison to their misinformation stimulus group while it decreased for the female participants. It was found from Table 3 and Table 13 that the difference between the misinformation stimulus and the inoculation + misinformation stimulus and the difference between the sexes of the participants had a significant interaction on the "Overall". Also, it was found that the value of the "Overall" of the male participants in the inoculation + misinformation stimulus group increased in comparison to their misinformation stimulus group while it decreased for the female participants. It was found from Table 3 and Table 14 that the difference between the sexes of the participants had a significant main effect on the "Overall" between the inoculation stimulus group and the inoculation + misinformation stimulus group independently from the difference in the study's stimuli. Also, it was found that the value of the "Overall" of the male participants was higher in both stimuli groups combined in comparison to the female participants.

The analyses of the main effects of the difference in the age groups of the participants and its interactions with the study's different stimuli showed some significant results. It was found from Table 4 and Table 13 that the difference between the age groups of the participants had a significant main effect on the Trust in Climate Scientists dependent variable between the misinformation stimulus group and the inoculation + misinformation stimulus group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Trust in Climate Scientists dependent variable of the participants aged from 18 to 29 years were lower in both stimuli groups combined in comparison to the participants aged from 30 to 59 years. It was found from Table 4 and Table 13 that the difference between the age groups of the participants had a significant main effect on the Anthropogenic Climate Change Acceptance dependent variable between the misinformation stimulus group and the inoculation + misinformation stimulus group independently from the difference in the study's stimuli. Also, it

was found that the mean values of the Anthropogenic Climate Change Acceptance dependent variable of the participants aged from 18 to 29 years were lower in both stimuli groups combined in comparison to the participants aged from 30 to 59 years. It was found from Table 4 and Table 12 that the difference between the inoculation stimulus and the misinformation stimulus and the difference between the age groups of the participants had a significant interaction on the Anthropogenic Climate Change Acceptance dependent variable. Also, it was found that the mean value of the Anthropogenic Climate Change Acceptance dependent variable of the participants aged between 18 and 29 years in the inoculation stimulus group increased in comparison to their misinformation stimulus group while it decreased for those aged between 30 and 59 years. This shows that the inoculation-only stimulus was only effective for the participants aged between 18 and 29 years in neutralizing the misinformation effect regarding the Anthropogenic Climate Change Acceptance dependent variable. It was found from Table 4 and Table 11 that the difference between the age groups of the participants had a significant main effect on the Perceived Scientific Consensus dependent variable between the inoculation + misinformation stimulus group and the control group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Perceived Scientific Consensus dependent variable of the participants aged from 18 to 29 years were lower in both stimuli groups combined in comparison to the participants aged from 30 to 59 years. It was found from Table 4 and Table 7 that the difference between the age groups of the participants had a significant main effect on the Perceived Human Influence dependent variable independently from the effects of the study's stimuli. Also, it was found that the aggregated mean value of the Perceived Human Influence dependent variable of the participants aged from 18 to 29 years was lower than that of the participants aged from 30 to 59 years. This shows that the participants aged from 30 to 59 years had a higher perception of the human influence on climate change than the participants aged from 18 to 29 years. It was found from Table 4 and Table 13 that the difference between the age groups of the participants had a significant main effect on the Perceived Human Influence dependent variable between the misinformation stimulus group and the inoculation + misinformation stimulus group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Perceived Human Influence dependent variable of the participants aged from 18 to 29 years were lower in both stimuli groups combined in comparison to the participants aged from 30 to 59 years. It was found from Table 4 and Table 14 that the

difference between the age groups of the participants had a significant main effect on the Perceived Human Influence dependent variable between the inoculation stimulus group and the inoculation + misinformation stimulus group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Perceived Human Influence dependent variable of the participants aged from 18 to 29 years were lower in both stimuli groups combined in comparison to the participants aged from 30 to 59 years. It was found from Table 4 and Table 7 that the difference between the study's stimuli and the difference between the age groups of the participants had a significant interaction on the Perceived Human Influence dependent variable. It was found from Table 4 and Table 10 that the difference between the inoculation stimulus and the control group and the difference between the age groups of the participants had a significant interaction on the Perceived Human Influence dependent variable. Also, it was found that the mean value of the Perceived Human Influence dependent variable of the participants aged between 18 and 29 years in the inoculation stimulus group decreased in comparison to their control group while it increased for those aged between 30 and 59 years. This shows that the inoculation-only stimulus was only effective for those aged between 30 and 59 years in increasing the perception of the human influence on climate change. It was found from Table 4 and Table 11 that the difference between the inoculation + misinformation stimulus and the control group and the difference between the age groups of the participants had a significant interaction on the Perceived Human Influence dependent variable. Also, it was found that the mean value of the Perceived Human Influence dependent variable of the participants aged between 18 and 29 years in the inoculation + misinformation stimulus group decreased in comparison to their control group while it increased for those aged between 30 and 59 years. This shows that the inoculation + misinformation stimulus was only effective for those aged between 30 and 59 years in increasing the perception of the human influence on climate change. It was found from Table 4 and Table 7 that the difference between the age groups of the participants had a significant main effect on the Scientific Consensus Influence dependent variable independently from the effects of the study's stimuli. Also, it was found that the aggregated mean value of the Scientific Consensus Influence dependent variable of the participants aged from 18 to 29 years was lower than that of the participants aged from 30 to 59 years. This shows that the participants aged from 30 to 59 years were influenced by the scientific consensus more than the participants aged from 18 to 29 years. It was found from Table 4 and Table 10 that the difference between the age groups of the

participants had a significant main effect on the Scientific Consensus Influence dependent variable between the inoculation stimulus and the control group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Scientific Consensus Influence dependent variable of the participants aged from 18 to 29 years were lower in both stimuli groups combined in comparison to the participants aged from 30 to 59 years. It was found from Table 4 and Table 9 that the difference between the age groups of the participants had a significant main effect on the Scientific Consensus Influence dependent variable between the misinformation stimulus group and the control group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Scientific Consensus Influence dependent variable of the participants aged from 18 to 29 years were lower in both stimuli groups combined in comparison to the participants aged from 30 to 59 years. It was found from Table 4 and Table 11 that the difference between the age groups of the participants had a significant main effect on the Scientific Consensus Influence dependent variable between the inoculation + misinformation stimulus group and the control group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Scientific Consensus Influence dependent variable of the participants aged from 18 to 29 years were lower in both stimuli groups combined in comparison to the participants aged from 30 to 59 years. It was found from Table 4 and Table 12 that the difference between the age groups of the participants had a significant main effect on the Scientific Consensus Influence dependent variable between the inoculation stimulus group and the misinformation stimulus group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Scientific Consensus Influence dependent variable of the participants aged from 18 to 29 years were lower in both stimuli groups combined in comparison to the participants aged from 30 to 59 years. It was found from Table 4 and Table 13 that the difference between the age groups of the participants had a significant main effect on the Scientific Consensus Influence dependent variable between the misinformation stimulus group and the inoculation + misinformation stimulus group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Scientific Consensus Influence dependent variable of the participants aged from 18 to 29 years were lower in both stimuli groups combined in comparison to the participants aged from 30 to 59 years. The main effects of the difference in the age groups of the participants were that the participants aged between 30 and 59 years had higher trust in climate scientists, were more accepting that climate

change is anthropogenic, had a higher perception of both the scientific consensus and the human influence on climate change and were influenced more by the scientific consensus. The interactions between the difference in the sex of the participants and the study's stimuli were that the inoculation-only stimulus was only effective for the participants aged between 18 and 29 years in neutralizing the misinformation effect regarding the Anthropogenic Climate Change Acceptance dependent variable. Also, the inoculation-only stimulus was only effective for those aged between 30 and 59 years in increasing the perception of the human influence on climate change while the inoculation + misinformation stimulus was only effective for those aged between 30 and 59 years in increasing the perception of the human influence on climate change. The results of this study also showed that older adults have higher concerns about the environment than younger ones for the Egyptian sample who participated in this research. This contradicts a recent analysis conducted by Reinhart (2018) which showed that younger Americans have more concerns about the environment than older adults (Reinhart, 2018). This difference in results might be due to the unequal distribution of the number of participants in this study among different age groups.

Additionally, it was found from Table 4 and Table 7 that the difference between the age groups of the participants had a significant main effect on the "Overall" independently from the difference in the study's stimuli. It was found from Table 4 and Table 11 that the difference between the age groups of the participants had a significant main effect on the "Overall" between the control group and the inoculation + misinformation stimulus group independently from the difference in the study's stimuli. Also, it was found that the value of the "Overall" of the participants aged from 18 to 29 years was lower in both stimuli groups combined in comparison to the participants aged from 30 to 59 years. It was found from Table 4 and Table 13 that the difference between the age groups of the participants had a significant main effect on the "Overall" between the misinformation stimulus group and the inoculation + misinformation stimulus group independently from the difference in the study's stimuli. Also, it was found that the value of the "Overall" of the participants aged from 18 to 29 years was lower in both stimuli groups combined in comparison to the participants aged from 30 to 59 years. It was found from Table 4 and Table 14 that the difference between the age groups of the participants had a significant main effect on the "Overall" between the inoculation stimulus group and the inoculation + misinformation stimulus group independently from the difference in the study's

stimuli. Also, it was found that the value of the "Overall" of the participants aged from 18 to 29 years was lower in both stimuli groups combined in comparison to the participants aged from 30 to 59 years. It was found from Table 4 and Table 11 that the difference between the control and the inoculation + misinformation stimulus and the difference between the age groups of the participants had a significant interaction on the "Overall". Also, it was found that the value of the "Overall" of the participants aged from 18 to 29 years in the inoculation + misinformation stimulus group decreased in comparison to their control group while it increased for the participants aged from 30 to 59 years.

The analyses of the main effects of the difference in the education levels of the participants and its interactions with the study's different stimuli showed some significant results. It was found from Table 5 and Table 9 that the difference between the education levels of the participants had a significant main effect on the Trust in Climate Scientists dependent variable between the misinformation stimulus group and the control group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Trust in Climate Scientists dependent variable of the high school diploma participants were lower in both stimuli groups combined in comparison to the Bachelor's degree, Master's degree, or Ph.D. participants. It was found from Table 5 and Table 11 that the difference between the inoculation + misinformation stimulus and the control group and the difference between the education level of the participants had a significant interaction on the Perceived Human Influence dependent variable. Also, it was found that the mean value of the Perceived Human Influence dependent variable of the high school diploma participants in the inoculation + misinformation stimulus group increased in comparison to their control group while it decreased for the Bachelor's degree, Master's degree, or Ph.D. participants. This shows that the inoculation + misinformation stimulus was only effective for the high school diploma participants in increasing the perception of the human influence on climate change. The main effects of the difference in the education level of the participants were that the Bachelor's degree, Master's degree, or Ph.D. participants had a higher level of trust in the climate scientists. The interactions between the difference in the education level of the participants and the study's stimuli were that the inoculation + misinformation stimulus was effective in increasing the perception of the human influence on climate change for the high school participants only. The results of this study showed that higher education level

contributes to higher trust in climate change scientists. This is in line with previous research which showed that education correlates with climate change beliefs (Czarnek et al., 2021).
Additionally, it was found from Table 5 and Table 11 that the difference between the control and the inoculation + misinformation stimulus and the difference between the education level of the participants had a significant interaction on the "Overall". Also, it was found that the value of the "Overall" of the high school diploma participants in the inoculation + misinformation stimulus group increased in comparison to their control group while it decreased for the Bachelor's degree, Master's degree, or Ph.D. participants.

The analyses of the main effects of the difference in the educational backgrounds of the participants and their interactions with the study's different stimuli showed some significant results. It was found from Table 6 and Table 10 that the difference between the educational backgrounds of the participants had a significant main effect on the Trust in Climate Scientists dependent variable between the inoculation stimulus and the control group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Trust in Climate Scientists dependent variable of the participants who have a Science and Technology background were lower in both stimuli groups combined in comparison to the participants who have a Social Sciences background. It was found from Table 6 and Table 14 that the difference between the educational backgrounds of the participants had a significant main effect on the Trust in Climate Scientists dependent variable between the inoculation stimulus group and the inoculation + misinformation stimulus group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Trust in Climate Scientists dependent variable of the participants who have a Science and Technology background were lower in both stimuli groups combined in comparison to the participants who have a Social Sciences background. It was found from Table 6 and Table 12 that the difference between the inoculation stimulus and the misinformation stimulus and the difference between the educational backgrounds of the participants had a significant interaction on the Trust in Climate Scientists dependent variable. Also, it was found that the mean value of the Trust in Climate Scientists dependent variable of the participants who have a Social Sciences background in the inoculation stimulus group increased in comparison to their misinformation stimulus group while it decreased for participants who have a Science and Technology background. This shows that the

inoculation-only stimulus was only effective for the participants who have a Social Sciences background in neutralizing the misinformation effect regarding the Trust in Climate Scientists dependent variable. It was found from Table 6 and Table 7 that the difference between the educational backgrounds of the participants had a significant main effect on the Anthropogenic Climate Change Acceptance dependent variable independently from the effects of the study's stimuli. Also, it was found that the aggregated mean value of the Anthropogenic Climate Change Acceptance dependent variable of the participants who have a Science and Technology background was lower than that of the participants who have a Social Sciences background. This shows that participants who have a Social Sciences background had higher acceptance that climate change is anthropogenic than the participants who have a Science and Technology background. It was found from Table 6 and Table 10 that the difference between the educational backgrounds of the participants had a significant main effect on the Anthropogenic Climate Change Acceptance dependent variable between the inoculation stimulus group and the control group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Anthropogenic Climate Change Acceptance dependent variable of the participants who have a Science and Technology background were lower in both stimuli groups combined in comparison to the participants who have a Social Sciences background. It was found from Table 6 and Table 9 that the difference between the educational backgrounds of the participants had a significant main effect on the Anthropogenic Climate Change Acceptance dependent variable between the misinformation stimulus and the control group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Anthropogenic Climate Change Acceptance dependent variable of the participants who have a Science and Technology background were lower in both stimuli groups combined in comparison to the participants who have a Social Sciences background. It was found from Table 6 and Table 11 that the difference between the educational backgrounds of the participants had a significant main effect on the Anthropogenic Climate Change Acceptance dependent variable between the inoculation + misinformation stimulus and the control group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Anthropogenic Climate Change Acceptance dependent variable of the participants who have a Science and Technology background were lower in both stimuli groups combined in comparison to the participants who have a Social Sciences background. It was found from Table 6 and Table 12 that the difference

between the educational backgrounds of the participants had a significant main effect on the Anthropogenic Climate Change Acceptance dependent variable between the inoculation stimulus group and the misinformation stimulus group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Anthropogenic Climate Change Acceptance dependent variable of the participants who have a Science and Technology background were lower in both stimuli groups combined in comparison to the participants who have a Social Sciences background. It was found from Table 6 and Table 14 that the difference between the educational backgrounds of the participants had a significant main effect on the Anthropogenic Climate Change Acceptance dependent variable between the inoculation stimulus group and the inoculation + misinformation stimulus group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Anthropogenic Climate Change Acceptance dependent variable of the participants who have a Science and Technology background were lower in both stimuli groups combined in comparison to the participants who have a Social Sciences background. It was found from Table 6 and Table 10 that the difference between the inoculation stimulus and the control group and the difference between the educational backgrounds of the participants had a significant interaction on the Perceived Human Influence dependent variable. Also, it was found that the mean value of the Perceived Human Influence dependent variable of the participants who have a Social Sciences background in the inoculation stimulus group increased in comparison to their control group while it decreased for participants who have a Science and Technology background. This shows that the inoculation-only stimulus was only effective for the participants who have a Social Sciences background in increasing the perception of the human influence on climate change. It was found from Table 6 and Table 12 that the difference between the inoculation stimulus and the misinformation stimulus and the difference between the educational backgrounds of the participants had a significant interaction on the Perceived Human Influence dependent variable. Also, it was found that the mean value of the Perceived Human Influence dependent variable of the participants who have a Social Sciences background in the inoculation stimulus group increased in comparison to their misinformation stimulus group while it decreased for participants who have a Science and Technology background. This shows that the inoculation-only stimulus was only effective for the participants who have a Social Sciences background in neutralizing the misinformation effect regarding the Perceived Human Influence dependent

variable. It was found from Table 6 and Table 14 that the difference between the inoculation stimulus and the inoculation + misinformation stimulus and the difference between the educational backgrounds of the participants had a significant interaction on the Perceived Human Influence dependent variable. Also, it was found that the mean value of the Perceived Human Influence dependent variable of the participants who have a Social Sciences background in the inoculation stimulus group increased in comparison to their inoculation + misinformation stimulus group while it decreased for participants who have a Science and Technology background. This shows that the inoculation + misinformation stimulus was only effective for the participants who have a Science and Technology background in increasing the perception of the human influence on climate change. It was found from Table 6 and Table 7 that the difference between the educational backgrounds of the participants had a significant main effect on the Climate Change Importance dependent variable independently from the effects of the study's stimuli. Also, it was found that the aggregated mean value of the Climate Change Importance dependent variable of the participants who have a Science and Technology background was higher than that of the participants who have a Social Sciences background. This shows that the participants who have a Science and Technology background considered climate change as an important topic more than the participants who have a Social Sciences background. It was found from Table 6 and Table 10 that the difference between the educational backgrounds of the participants had a significant main effect on the Climate Change Importance dependent variable between the inoculation stimulus and the control group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Climate Change Importance dependent variable of the participants who have a Science and Technology background were higher in both stimuli groups combined in comparison to the participants who have a Social Sciences background. It was found from Table 6 and Table 9 that the difference between the educational backgrounds of the participants had a significant main effect on the Climate Change Importance dependent variable between the misinformation stimulus group and the control group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Climate Change Importance dependent variable of the participants who have a Science and Technology background were higher in both stimuli groups combined in comparison to the participants who have a Social Sciences background. It was found from Table 6 and Table 12 that the difference between the educational backgrounds of the participants had a significant

main effect on the Climate Change Importance dependent variable between the inoculation stimulus group and the misinformation stimulus group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Climate Change Importance dependent variable of the participants who have a Science and Technology background were higher in both stimuli groups combined in comparison to the participants who have a Social Sciences background. It was found from Table 6 and Table 13 that the difference between the educational backgrounds of the participants had a significant main effect on the Climate Change Importance dependent variable between the misinformation stimulus group and the inoculation + misinformation stimulus group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Climate Change Importance dependent variable of the participants who have a Science and Technology background were higher in both stimuli groups combined in comparison to the participants who have a Social Sciences background. It was found from Table 6 and Table 7 that the difference between the study's stimuli and the difference between the educational backgrounds of the participants had a significant interaction on the Climate Change Importance dependent variable. It was found from Table 6 and Table 11 that the difference between the inoculation + misinformation stimulus and the control group and the difference between the educational backgrounds of the participants had a significant interaction on the Climate Change Importance dependent variable. Also, it was found that the mean value of the Climate Change Importance dependent variable of the participants who have a Social Sciences background in the inoculation + misinformation stimulus group increased in comparison to their control group while it decreased for participants who have a Science and Technology background. This shows that the inoculation + misinformation stimulus was only effective for the participants who have a Social Sciences background in increasing the climate change importance. It was found from Table 6 and Table 12 that the difference between the inoculation stimulus and the misinformation stimulus and the difference between the educational backgrounds of the participants had a significant interaction on the Climate Change Importance dependent variable. Also, it was found that the mean value of the Climate Change Importance dependent variable of the participants who have a Social Sciences background in the inoculation stimulus group increased in comparison to their misinformation stimulus group while it decreased for participants who have a Science and Technology background. This shows that the inoculation-only stimulus was only effective for the participants who have a Social Sciences

background in neutralizing the misinformation effect regarding the Climate Change Importance dependent variable. It was found from Table 6 and Table 13 that the difference between the misinformation stimulus and the inoculation + misinformation stimulus and the difference between the educational backgrounds of the participants had a significant interaction on the Climate Change Importance dependent variable. Also, it was found that the mean value of the Climate Change Importance dependent variable of the participants who have a Social Sciences background in the misinformation stimulus group decreased in comparison to their inoculation + misinformation stimulus group while it increased for participants who have a Science and Technology background. This shows that the inoculation + misinformation stimulus was only effective for the participants who have a Social Sciences background in neutralizing the misinformation effect regarding the Climate Change Importance dependent variable. It was found from Table 6 and Table 11 that the difference between the educational backgrounds of the participants had a significant main effect on the Scientific Consensus Influence dependent variable between the inoculation + misinformation stimulus group and the control group independently from the difference in the study's stimuli. Also, it was found that the mean values of the Scientific Consensus Influence dependent variable of the participants who have a Science and Technology background were lower in both stimuli groups combined in comparison to the participants who have a Social Sciences background. It was found from Table 6 and Table 7 that the difference between the study's stimuli and the difference between the educational backgrounds of the participants had a significant interaction on the Scientific Consensus Influence dependent variable. It was found from Table 6 and Table 9 that the difference between the misinformation stimulus and the control group and the difference between the educational backgrounds of the participants had a significant interaction on the Scientific Consensus Influence dependent variable. Also, it was found that the mean value of the Scientific Consensus Influence dependent variable of the participants who have a Social Sciences background in the misinformation stimulus group decreased in comparison to their control group while it increased for participants who have a Science and Technology background. This shows that the misinformation-only stimulus was only effective for the participants who have a Social Sciences background in decreasing the influence of the scientific consensus. It was found from Table 6 and Table 13 that the difference between the misinformation stimulus and the inoculation + misinformation stimulus and the difference between the educational backgrounds of the

participants had a significant interaction on the Scientific Consensus Influence dependent variable. Also, it was found that the mean value of the Scientific Consensus Influence dependent variable of the participants who have a Social Sciences background in the misinformation stimulus group decreased in comparison to their inoculation + misinformation stimulus group while it increased for participants who have a Science and Technology background. This shows that the inoculation + misinformation stimulus was only effective for the participants who have a Social Sciences background in neutralizing the misinformation effect regarding the Scientific Consensus Influence dependent variable. The main effects of the difference in the educational backgrounds of the participants were that the participants who have a Social Sciences background had a higher level of trust in climate scientists, a higher acceptance of climate change being anthropogenic, and were more influenced by the scientific consensus while the participants who have a Science and Technology background had more interest in climate change as an important topic. The interactions between the difference in the educational backgrounds of the participants and the study's stimuli were that the inoculation-only stimulus was only effective for the participants who have a Social Sciences background in neutralizing the misinformation effect regarding the Trust in Climate Scientists dependent variable. Also, the inoculation-only stimulus was only effective for the participants who have a Social Sciences background in neutralizing the misinformation effect regarding the Perceived Human Influence dependent variable and in increasing the perception of the human influence on climate change. Additionally, the inoculation + misinformation stimulus was only effective for the participants who have a Science and Technology background in increasing the perception of the human influence on climate change. Moreover, the inoculation-only stimulus was only effective for the participants who have a Social Sciences background in neutralizing the misinformation effect regarding the Climate Change Importance dependent variable. Also, the inoculation + misinformation stimulus was only effective for the participants who have a Social Sciences background in neutralizing the misinformation effect regarding the Climate Change Importance dependent variable and in increasing the climate change importance. Furthermore, the misinformation-only stimulus was only effective for the participants who have a Social Sciences background in decreasing the influence of the scientific consensus. Also, the inoculation + misinformation stimulus was only effective for the participants who have a Social Sciences background in neutralizing the misinformation effect regarding the Scientific Consensus Influence dependent variable.

Additionally, it was found from Table 6 and Table 12 that the difference between the inoculation stimulus and the misinformation stimulus and the difference between the educational background of the participants had a significant interaction on the "Overall". Also, it was found that the value of the "Overall" of the participants who have a Social Sciences background in the inoculation stimulus group increased in comparison to their misinformation stimulus group while it decreased for the participants who have a Science and Technology background.

A limitation of this research is the usage of a quite simple manual randomization technique which did not accommodate for ensuring that each stratum of the demographic variables of the participants had an equal number of subjects. The technique only ensured having an equal number of subjects in each study stimulus group. An electronic randomization technique for randomization that would take into consideration the different strata of the demographic variables would enhance future research. The participants of this study were all well-educated individuals who are either studying or working at the American University in Cairo. Further research that would include a broader sample could provide more generalizable results.

Chapter 5

Conclusion and future work

The misinformation about climate change can undermine the public perception of the scientific consensus. However, inoculation can play a role in protecting individuals against the negative effects of misinformation. The demographic differences between individuals have interactions with misinformation about climate change. These demographic differences also play a role in the extent of effectiveness of inoculation's effect on neutralizing misinformation. The results of this study could assist in formulating health policy recommendations regarding using the inoculation technique in the climate change communication context. Using inoculation for climate change communication would have positive effects on male audiences. It would also have a positive effect on individuals with high school diplomas. Additionally, it would have a positive effect on individuals who have social sciences background. Therefore, the consideration of using inoculation in climate change communication along with the existing raising awareness techniques would have an additional public health benefit. A future research study to study the effect of inoculation on neutralizing misinformation could be conducted with the addition of a follow-up survey that would be filled out by the participants one week or two weeks later after exposure to test the effect of inoculation after some time has passed.

References

Abutaleb, K.A.A., Mohammed, A.H.ES. & Ahmed, M.H.M. Climate Change Impacts, Vulnerabilities and Adaption Measures for Egypt's Nile Delta. Earth Syst Environ 2, 183–192 (2018). https://doi.org/10.1007/s41748-018-0047-9

Aklin, M., & Urpelainen, J. (2014). Perceptions of scientific dissent undermine public support for environmental policy. *Environmental Science & Policy*, *38*, 173–177. https://doi.org/10.1016/j.envsci.2013.10.006

Anderegg, W. R. L., Prall, J. W., Harold, J., & Schneider, S. H. (2010). Expert credibility in climate change. *Proceedings of the National Academy of Sciences*, *107*(27), 12107–12109. https://doi.org/10.1073/pnas.1003187107

Atwoli L, Erhabor G E, Gbakima A A, Haileamlak A, Ntumba J K, Kigera J et al. COP27 climate change conference: urgent action needed for Africa and the world BMJ 2022; 379 :o2459 doi:10.1136/bmj.o2459

Banas, J. A., & Miller, G. (2013). Inducing Resistance to Conspiracy Theory Propaganda: Testing Inoculation and Metainoculation Strategies. *Human Communication Research*, *39*(2), 184–207. https://doi.org/10.1111/hcre.12000

Banas, J. A., & Rains, S. A. (2010). A Meta-Analysis of Research on Inoculation Theory. *Communication Monographs*, *77*(3), 281–311. https://doi.org/10.1080/03637751003758193

Batisha A.F. (2012) Adaptation of Sea Level Rise in Nile Delta Due to Climate Change. J Earth Sci Climate Change 3: 114. Doi: 10.4172/2157-7617.1000114

Bolsen, T., & Druckman, J. N. (2015). Counteracting the Politicization of Science. *Journal of Communication*, *65*(5), 745–769. https://doi.org/10.1111/jcom.12171

Buechner, M. M. (2022, September 21). Deadly Floods In Pakistan Linked To Climate Change. Forbes. https://www.forbes.com/sites/unicefusa/2022/09/21/deadly-floods-in-pakistan-linked-to-climate-change/?sh=3b25adb32f8e

Calleja, N., AbdAllah, A., Abad, N., Ahmed, N., Albarracin, D., Altieri, E., Anoko, J. N., Arcos, R., Azlan, A. A., Bayer, J., Bechmann, A., Bezbaruah, S., Briand, S. C., Brooks, I., Bucci, L. M., Burzo, S., Czerniak, C., de Domenico, M., Dunn, A. G., … Purnat, T. D. (2021). A Public Health Research Agenda for Managing Infodemics: Methods and Results of the First WHO Infodemiology Conference. *JMIR Infodemiology*, *1*(1), e30979. https://doi.org/10.2196/30979

Chigwedere, P., Seage, G. R., Gruskin, S., Lee, T.-H., & Essex, M. (2008). Estimating the Lost Benefits of Antiretroviral Drug Use in South Africa. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, *49*(4), 410–415. https://doi.org/10.1097/QAI.0b013e31818a6cd5

CIRCE. (2021). How can we us CI to improve the human condition? CIRCE, the Cognitive Immunology Research Collaborative. Retrieved May 10, 2023, from https://cognitiveimmunology.net/applied-ci

CLINTEL. (2022). World Climate Declaration. In Climate Intelligence Foundation (CLINTEL). https://clintel.org/world-climate-declaration/

Compton, J. (2012). Inoculation Theory. In *The SAGE Handbook of Persuasion: Developments in Theory and Practice* (pp. 220–236). SAGE Publications, Inc. https://doi.org/10.4135/9781452218410.n14

Cook, J. (2016). Countering Climate Science Denial and Communicating Scientific Consensus. In *Oxford Research Encyclopedia of Climate Science*. Oxford University Press. https://doi.org/10.1093/acrefore/9780190228620.013.314

Cook, J., Lewandowsky, S., & Ecker, U. K. H. (2017). Neutralizing misinformation through

inoculation: Exposing misleading argumentation techniques reduces their influence. *PLOS ONE*, *12*(5), e0175799. https://doi.org/10.1371/journal.pone.0175799
Cook, J., Oreskes, N., Doran, P. T., Anderegg, W. R. L., Verheggen, B., Maibach, E. W., Carlton, J. S., Lewandowsky, S., Skuce, A. G., Green, S. A., Nuccitelli, D., Jacobs, P., Richardson, M., Winkler, B., Painting, R., & Rice, K. (2016). Consensus on consensus: a synthesis of consensus estimates on human-caused global warming. *Environmental Research Letters*, *11*(4), 048002. https://doi.org/10.1088/1748-9326/11/4/048002
Czarnek, G., Kossowska, M., & Szwed, P. (2021). Right-wing ideology reduces the effects of education on climate change beliefs in more developed countries. Nature Climate Change, 11(1), 9–13. https://doi.org/10.1038/s41558-020-00930-6
Ecker, U. K. H., Lewandowsky, S., Cook, J., Schmid, P., Fazio, L. K., Brashier, N., Kendeou, P., Vraga, E. K., & Amazeen, M. A. (2022). The psychological drivers of misinformation belief and its resistance to correction. *Nature Reviews Psychology*, *1*(1), 13–29. https://doi.org/10.1038/s44159-021-00006-y
Diethelm, P., & McKee, M. (2008). Denialism: what is it and how should scientists respond? *The European Journal of Public Health*, *19*(1), 2–4. https://doi.org/10.1093/eurpub/ckn139
Ding, D., Maibach, E. W., Zhao, X., Roser-Renouf, C., & Leiserowitz, A. (2011). Support for climate policy and societal action are linked to perceptions about scientific agreement. *Nature Climate Change*, *1*(9), 462–466. https://doi.org/10.1038/nclimate1295
Doran, P. T., & Zimmerman, M. K. (2009). Examining the Scientific Consensus on Climate Change. *Eos, Transactions American Geophysical Union*, *90*(3), 22. https://doi.org/10.1029/2009EO030002
Duryea, E. J. (1983). Utilizing tenets of inoculation theory to develop and evaluate a preventive alcohol education intervention. *The Journal of School Health*, *53*(4), 250–256. https://doi.org/10.1111/j.1746-1561.1983.tb01139.x
Euronews. (2022, September 16). Fact check: Did 1,200 climate experts sign "declaration" denying climate emergency? Euronews. https://www.euronews.com/my-europe/2022/09/16/fact-check-did-1200-climate-experts-sign-declaration-denying-climate-emergency
Finucane, M. L., Slovic, P., Mertz, C. K., Flynn, J., & Satterfield, T. A. (2000). Gender, race, and perceived risk: The 'white male' effect. Health, Risk & Society, 2(2), 159–172. https://doi.org/10.1080/713670162
Gardner, M. N., & Brandt, A. M. (2006). "The doctors'' choice is America's choice": the physician in US cigarette advertisements, 1930-1953." *American Journal of Public Health*, *96*(2), 222–232. https://doi.org/10.2105/AJPH.2005.066654
Graham, C. (2022). Despair Underlies our Misinformation Crisis. John Templeton Foundation. Retrieved May 10, 2023, from https://www.templeton.org/news/despair-underlies-our-misinformation-crisis
Hassanin, L. 2010. "Egypt". Global Information Society Watch. Available at: https://giswatch.org/sites/default/files/gisw2010countryegypt_en.pdf
Jensen C (1998) Re: Fred Singer's comment on Trenberth's article. Available at: https://web.archive.org/web/20060329110844/http://naturalscience.com/ns/letters/ns_let08.html (accessed 26 November 2022).
Johnson BT, Maio GR and Smith-McLallen A (2005) Communication and attitude change: Causes, processes, and effects. In: Albarracín D, Johnson BT and Zanna MP (eds) The Handbook of Attitudes. Mahwah, NJ: Lawrence Erlbaum, pp. 617–670.
Johnson, T. J., Bichard, S. L., & Zhang, W. (2009). Communication Communities or "CyberGhettos"?: A Path Analysis Model Examining Factors that Explain Selective Exposure to Blogs. *Journal of*

Computer-Mediated Communication, *15*(1), 60–82. https://doi.org/10.1111/j.1083-6101.2009.01492.x
Koehler, D. J. (2016). Can journalistic "false balance" distort public perception of consensus in expert opinion? *Journal of Experimental Psychology: Applied*, *22*(1), 24–38. https://doi.org/10.1037/xap0000073
Lewandowsky, S., Gignac, G. E., & Vaughan, S. (2013). The pivotal role of perceived scientific consensus in acceptance of science. *Nature Climate Change*, *3*(4), 399–404. https://doi.org/10.1038/nclimate1720
Loomba, S., de Figueiredo, A., Piatek, S. J., de Graaf, K., & Larson, H. J. (2021). Measuring the impact of COVID-19 vaccine misinformation on vaccination intent in the UK and USA. *Nature Human Behaviour*, *5*(3), 337–348. https://doi.org/10.1038/s41562-021-01056-1
Lotfy, Wael M. 2014. "Climate Change and Epidemiology of Human Parasitosis in Egypt: A Review." Journal of Advanced Research 5(6):607–13. doi: 10.1016/j.jare.2013.06.009.
McGuire, W. J., & Papageorgis, D. (1961). The relative efficacy of various types of prior belief-defense in producing immunity against persuasion. *The Journal of Abnormal and Social Psychology*, *62*(2), 327–337. https://doi.org/10.1037/h0042026
Ministry of Environment of Egypt. (2022). Sowing seeds for future generations, Egypt's leadership on climate mitigation and adaptation. https://cop27.eg/assets/files/SOWINGSEEDS.pdf
Niederdeppe, J., Gollust, S. E., & Barry, C. L. (2014). Inoculation in Competitive Framing. *Public Opinion Quarterly*, *78*(3), 634–655. https://doi.org/10.1093/poq/nfu026
Oregon Global Warming Petition Project, http://www.petitionproject.org/ (accessed: 26 November 2022).
Pfau, M., Bockern, S. van, & Kang, J. G. (1992). Use of inoculation to promote resistance to smoking initiation among adolescents. *Communication Monographs*, *59*(3), 213–230. https://doi.org/10.1080/03637759209376266
Reinhart, B. R. (2018, May 11). Global Warming Age Gap: Younger Americans Most Worried. Gallup.com. https://news.gallup.com/poll/234314/global-warming-age-gap-younger-americans-worried.aspx
Richter, T., Schroeder, S., & Wöhrmann, B. (2009). You don't have to believe everything you read: Background knowledge permits fast and efficient validation of information. *Journal of Personality and Social Psychology*, *96*(3), 538–558. https://doi.org/10.1037/a0014038
Roozenbeek, J., Van Der Linden, S., Goldberg, B., Rathje, S., & Lewandowsky, S. (2022). Psychological inoculation improves resilience against misinformation on social media. Science Advances, 8(34). https://doi.org/10.1126/sciadv.abo6254
Scheufele, D. A., & Krause, N. M. (2019). Science audiences, misinformation, and fake news. *Proceedings of the National Academy of Sciences*, *116*(16), 7662–7669. https://doi.org/10.1073/pnas.1805871115
Schmid-Petri, H., & Bürger, M. (2022). The effect of misinformation and inoculation: Replication of an experiment on the effect of false experts in the context of climate change communication. *Public Understanding of Science*, *31*(2), 152–167. https://doi.org/10.1177/09636625211024550
State Information Service. (2022, September 4). Egypt and Climate Change. State Information Service. https://www.sis.gov.eg/Story/160255/Egypt-and-Climate-Change?lang=en-us
Stiff JB (1994) Persuasive Communication. New York: Guilford Press.
van der Linden, S. L., Leiserowitz, A. A., Feinberg, G. D., & Maibach, E. W. (2015). The Scientific Consensus on Climate Change as a Gateway Belief: Experimental Evidence. *PLOS ONE*, *10*(2), e0118489. https://doi.org/10.1371/journal.pone.0118489
Traberg, C. S., Roozenbeek, J., & Van Der Linden, S. (2022). Psychological Inoculation against

Misinformation: Current Evidence and Future Directions. Annals of the American Academy of Political and Social Science, 700(1), 136–151. https://doi.org/10.1177/00027162221087936
van der Linden, S., Leiserowitz, A., Rosenthal, S., & Maibach, E. (2017). Inoculating the Public against Misinformation about Climate Change. *Global Challenges*, *1*(2), 1600008. https://doi.org/10.1002/gch2.201600008
WHO. (2020, December 22). Infodemic. World Health Organization. https://www.who.int/health-topics/infodemic
Wood, M. L. M. (2007). Rethinking the Inoculation Analogy: Effects on Subjects With Differing Preexisting Attitudes. *Human Communication Research*, *33*(3), 357–378. https://doi.org/10.1111/j.1468-2958.2007.00303.x
[UNDP] United Nations Development Programme. 2007. Human development report 2007/2008: fighting climate change: human solidarity in a divided world. New York: Palgrave Macmillan.
Zhao, J., & Luo, Y. (2021). A framework to address cognitive biases of climate change. Neuron, 109(22), 3548–3551. https://doi.org/10.1016/j.neuron.2021.08.029

Appendices

Appendix A: Inoculation stimulus (Cook et al., 2017; Schmid-Petri & Bürger, 2022):
Promoting "fake experts" to manufacture doubt about science.

The profits of the tobacco industry were threatened in the 1970s by the scientific evidence linking smoking with lung cancer. Similarly, scientific evidence linking fossil fuel emissions with global warming threatens the profits of the fossil fuel industry.

In these cases, a common tactic for industry groups and organisations is to manufacture doubt about the science through the promotion of "fake experts". Fake experts are spokespeople who convey the impression of expertise in a given area without possessing actual relevant experience.

The tobacco industry, in particular, has used fake experts to make the consequences of smoking appear in a better light. The very same strategy is now widely adopted in the climate change arena to convey the impression that climate scientists are still debating human-caused global warming.

However, the cited "experts" actually consist of tens of thousands of non-experts whose area of expertise is in some domain other than climate change. Drawing upon non-expert opinion on a complex topic such as climate change is equivalent to asking a dentist to perform heart surgery. A white coat alone does not make a heart surgeon.

Appendix B: Misinformation stimulus (CLINTEL, 2022; Cook et al., 2017; Schmid-Petri & Bürger, 2022):

The Global Warming Petition Project

The following text was excerpted from the Global Warming Petition Project website, run by the Oregon Institute for Science & Medicine.

"31,487 American scientists have signed this petition, including 9,029 with PhDs."

Petition

We urge the United States government to reject the global warming agreement that was written in Kyoto, Japan in December, 1997, and any other similar proposals. The proposed limits on greenhouse gases would harm the environment, hinder the advance of science and technology, and damage the health and welfare of mankind.

There is no convincing scientific evidence that human release of carbon dioxide, methane, or other greenhouse gases is causing or will, in the foreseeable future, cause catastrophic heating of the Earth's atmosphere and disruption of the Earth's climate. Moreover, there is substantial scientific evidence that increases in atmospheric carbon dioxide produce many beneficial effects upon the natural plant and animal environments of the Earth.

Please sign here

☒ Please send more petition cards for me to distribute.

My academic degree is B.S. ☐ M.S. ☐ Ph.D. ☒ in the field of PHYSICS

The purpose of the Petition Project is to demonstrate that the claim of "settled science" and an overwhelming "consensus" in favor of the hypothesis of human-caused global warming and consequent climatological damage is wrong. No such consensus or settled science exists. As indicated by the petition text, a very large number of American scientists reject this hypothesis.

It is evident that 31,487 Americans with university degrees in science – including 9,029 PhDs, are not "a few." Moreover, from the clear and strong petition statement that they have signed, it is evident that these 31,487 American scientists are not "skeptics."

The human-caused global warming hypothesis is without scientific validity and government action on the basis of this hypothesis are unnecessary and counterproductive. Government regulation would damage both human prosperity and the natural environment of the Earth.

The World Climate Declaration

On 27 June 2022, the "World Climate Declaration" stating that there is no climate emergency was signed by 1,107 scientists and professionals from 40 countries.

The declaration stated the following:

Climate science should be less political, while climate policies should be more scientific. Scientists should openly address uncertainties and exaggerations in their predictions of global warming, while politicians should dispassionately count the real costs as well as the imagined benefits of their policy measures

- Natural as well as anthropogenic factors cause warming
- Warming is far slower than predicted
- Climate policy relies on inadequate models
- CO2 is plant food, the basis of all life on Earth
- Global warming has not increased natural disasters
- Climate policy must respect scientific and economic realities

To believe the outcome of a climate model is to believe what the model makers have put in. This is precisely the problem of today's climate discussion to which climate models are central. Climate science has degenerated into a discussion based on beliefs, not on sound self-critical science. Should not we free ourselves from the naive belief in immature climate models?

Appendix C: Survey Questions

Demographics questions:

1. Please specify your sex:
   - ☐ Female
   - ☐ Male

2. Please specify your age group:
   - ☐ 18 to 29 years
   - ☐ 30 to 44 years
   - ☐ 45 to 59 years
   - ☐ 60 to 74 years

3. Please specify whether you are Egyptian or not:
   - ☐ Egyptian
   - ☐ Non-Egyptian

4. Please specify your education level:
   - ☐ High school diploma
   - ☐ Bachelor's degree
   - ☐ Master's degree
   - ☐ Ph.D.
   - ☐ Other, please specify: _____

5. Please specify your educational background:
   - ☐ Social Sciences
   - ☐ Life Sciences
   - ☐ Engineering/Architecture
   - ☐ Other, please specify: _____

Attention filter questions (Cook et al., 2017; Schmid-Petri & Bürger, 2022):

6. What strategy is used to manufacture doubt about a scientific consensus?
   - ☐ Street protests
   - ☐ Fake experts
   - ☐ Flash mobs
   - ☐ Nothing
   - ☐ Physical violence

7. What was the topic of the article on the previous page?
   - ☐ Cancer treatment
   - ☐ Astronomy
   - ☐ Climate change
   - ☐ Neuroscience
   - ☐ Ancient history

Trust in Climate Scientists (Cook et al., 2017):

8. Please specify how strongly you trust climate scientists
   (5-item Likert scale from Strongly Disagree to Strongly Agree)

	Strongly Disagree (1)	(2)	(3)	(4)	trongly Agree (5)
limate scientists can be depended upon to help increase our understanding of what's happening to our climate.					
esearch that challenges the mainstream point of view is given honest treatment by the scientific community.					
he process by which scientific papers are peer-reviewed and published is reliable.					
limate scientists are sincere in their research into climate.					
trust the things that scientists say about climate change.					

Anthropogenic Climate Change Acceptance (Cook et al., 2017):

9. Please specify how strongly you accept that climate change is caused by humans:
   (5-item Likert scale from Strongly Disagree to Strongly Agree)

	Strongly Disagree (1)	(2)	(3)	(4)	trongly Agree (5)
he climate is always changing and what we are currently observing is just natural fluctuation.					
lost of the warming over the last 50 years is due to the increase in greenhouse gas concentrations.					
he burning of fossil fuels over the last 50 years has caused serious damage to the planet's climate.					
luman carbon dioxide emissions cause climate change.					
lumans are too insignificant to have an appreciable impact on global temperature.					

Perceived Scientific Consensus (Cook et al., 2017):

10. How many climate experts agree that the global warming we are witnessing is a direct consequence of the burning of fossil fuels by humans?

☐ Less than 5%
☐ Between 5% to 10%
☐ Between 10% to 30%
☐ Between 30% to 50%
☐ Between 50% to 70%
☐ Between 70% to 90%
☐ Between 90% to 95%
☐ More than 95%

Perceived Human Influence (Buechner, 2022; Cook et al., 2017; Schmid-Petri & Bürger, 2022; State Information Service, 2022):

11. Please estimate the contribution from human carbon dioxide emissions to cause each event:
(from 0% to 100%)

vent	stimated percentage
ncrease in atmospheric temperature of 0.8 degrees Celsius since 1880	
ncrease of global sea level of 20 cm since 1880	
oubling of weather-related natural disasters over the last 30 years	
he floods in Pakistan in June 2022	
he heat wave in Egypt in August 2022	

Scientific Consensus Influence:

12. To what extent do you think the information about scientific consensus would influence:

	lot influenced at all	ittle influence	ome influence	loderate influence	onsiderable influence
ourself					
our closet friend					
lembers of your family					
nhabitants of the same governorate					
ther people in general					

Climate Change Importance:

13. How strongly are you interested in the topic of climate change?

	lot interested	2)	3)	4)	very strong interest

	at all (1)				
nterest in climate change					

14. How important do you personally consider the issue of climate change to be?

	ot important at all (1)	2)	3)	4)	ery Important (5)
ow important do you personally consider the issue of climate change to be?					

Support for the efforts of climate mitigation and adaptation (Ministry of Environment of Egypt, 2022):

15. Please specify how strongly you agree with each of the following projects:

	Strongly Disagree (1)	(2)	(3)	(4)	trongly Agree (5)
onverting the street lighting systems to LED (Light-emitting diode) lighting systems which are more efficient.					
roducing electricity from waste instead of dumping or burning it.					
ublic transportation by electric buses and public bicycle-sharing systems.					
sing solar energy in industrial facilities for electricity generation and heating water.					
reatment of wastewater by disinfection and chlorination to be used for irrigation.					
ompensating the lower yield of the open sea by establishing aquaculture systems.					
rotecting fisheries by the rehabilitation of the northern lakes to enhance harvesting of fish.					
rotecting the coastal zone from the rise of sea level due to climate change by trapping sand to form a dune system.					

Appendix D: Debriefing text (Cook et al., 2017; Euronews, 2022):

Tens of Thousands of "Fake Experts": Putting the Global Warming Petition Project in proper context

An earlier page in this survey presented information taken from the Global Warming Petition Project website. This information is highly misleading, designed to manufacture doubt about the scientific consensus that humans are causing global warming.

The scientific consensus on climate change is robust, manifesting in a number of different ways. A strengthening consensus is found in published peer-reviewed research. There is a consensus among the world's most prestigious scientific organizations with statements issued by National Academies of Science in 78 countries. There is a consensus among the climate science community with 97% agreement among actively publishing climate scientists.

Given such agreement among an overwhelming majority of climate scientists, a common way to portray a false picture of a divided scientific community is to promote scientists with supposedly impressive credentials who actually possess scant expertise in climate science.

The most prominent example of this "fake experts" strategy is the Petition Project, first published in 2008 by the Oregon Institute of Science and Medicine. This petition lists over 31,000 scientists who dispute that human activity is disrupting our climate.

With 97% consensus among climate scientists, how is it over 31,000 scientists disagree with the consensus? This is because around 99.9% of the signatories on the Petition Project are not climate scientists. Anyone with a Bachelor of Science or higher can be listed. The list includes graduates of computer science, mechanical engineering, zoology and other fields unrelated to climate science.

The survey also demonstrates a lack of quality control. Characters from the television show M*A*S*H and members of the Spice Girls pop band have been added to the list. In response to this, the Oregon Institute of Science & Medicine commented that there was no way of filtering out fake names from their survey.

Given the lack of climate expertise, the Petition Project is a transparent ploy to foster the impression of ongoing debate on the basic fact of human-caused global warming, among the climate science community where none exists.

Hundreds of "Fake Experts": Putting the World Climate Declaration in proper context

As for the "World Climate Declaration", none of those who signed the documents were climate scientists. Additionally, a retired geophysicist who used to work for an oil giant company, and another person who is a journalist are both the leading persons of this document.