



# Correlates of belief in climate change: Demographics, ideology and belief systems

Adrian Furnham<sup>a,\*</sup>, Charlotte Robinson<sup>b</sup>

<sup>a</sup> Department of Leadership and Organisational Behaviour, Norwegian Business School (BI), Nydalsveien, Oslo, Norway

<sup>b</sup> Department of Psychology, University of Bath, United Kingdom

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## ABSTRACT

This paper reports on two studies that examine correlates of attitudes to climate change (ACC). In the first study, five hundred participants completed five questionnaires and an intelligence test as well as two related measures of ACC. Using correlations and regressions we examined the relationship between ACC and demography (gender, age, education), ideology (political and religious beliefs), intelligence, self-beliefs, Belief in a Just World and the endorsement of Conspiracy Theories. One climate change questionnaire factored into three factors labelled Impact, Fatalism, and Personal action. The most consistent finding was that political opinions were most strongly related to climate change beliefs: more conservative thinkers denied that individuals could do anything. In the second study, also with 500 participants, we asked one question concerning how seriously they took the issue of global warming. Again, we examined the relationship with this response and the participants' demography, ideology and self-ratings. Political beliefs primarily were related to global warming concerns, as in the first study. Results are discussed in terms of climate change as an ideology and the possible changing of these beliefs. Limitations, like the representativeness of the sample and the single-item measure in the second study are acknowledged.

## 1. Introduction

Beliefs about, and the understanding of, climate change has become, over the last decade, a topic of considerable academic attention from many points of view. It has become as much a political issue as a scientific issue, associated with considerable passion as individuals and groups with differing opinions clash over many issues (Beattie et al., 2011; Bertin et al., 2021; Jylhä et al., 2016; Matthews, 2015; Painter & Ashe, 2012; Poortinga et al., 2011; Sinatra et al., 2012; Wong-Parodi & Feygina, 2020). This study is concerned with demographic (age, education, gender), ideological (religious, political beliefs), ability (IQ), self-perceptions and belief systems (Belief in a Just World-BJW, Conspiracy theories) correlates of these attitudes to climate change (ACC). Whilst some of these individual difference variables have been investigated before with regard to ACC, others like the BJW appear not to have been considered. We were particularly interested in the incremental validity of belief systems over demographic and ideological variables in predicting ACC.

It appears that the ACC argument and debate revolves around three issues: whether *unusual* climate change is actually occurring; the role of

*human behaviour* in those changes, and the extent to which we can *influence* the factors that affect the climate (Dias et al., 2020). The climate change “denial/sceptical” position appears to be that climate is, and has always been, changing and that any changes we can reliable measure are due to natural, cyclical forces (McCright & Dunlap, 2011). Opposed to this view is that there is reliable, agreed, scientific evidence of dramatic change caused *primarily* by humans, through such things as the burning of fossil fuels, farming practices and over-population. Sceptics tend to be fatalistic while activists/instrumentalists are eager to prevent what they see to be catastrophe, though it is possible that both those who accept and reject human behavioral causes of climate change may be fatalistic about intervention (Poortinga et al., 2011).

Some have distinguished between different kinds of sceptics (Van Rensburg, 2015). Rahmstorf (2005) distinguished between (1) *trend sceptics* (who deny the global warming trend), (2) *attribution sceptics* (who accept the trend, but either question the anthropogenic contribution saying it is overstated, negligent or non-existent compared to other factors like natural variation, or say it is not known with sufficient certainty what the main causes are) and (3) *impact sceptics* (who accept human causation, but claim impacts may be benign or beneficial, or that

\* Corresponding author.

E-mail address: [adrian@adrianfurnham.com](mailto:adrian@adrianfurnham.com) (A. Furnham).

the models are not robust enough and/or question the need for strong regulatory policies or interventions).

There have been many studies on attitudes to climate change (ACC) and there are a number of scales to measure those attitudes (Christensen & Knezek, 2015; Dias et al., 2020; Dijkstra & Goedhart, 2012; Dunlap et al., 2000, 2016). For instance, Dias et al. (2020) found gender, age, education, occupation and values were modestly related to ACC. There is also much evidence for the relationship between political conservatism and climate change denial (Krange et al., 2019; McCright & Dunlap, 2011). In an important review of salient studies, Valkengoed and Steg (2019) conducted a series of meta-analyses using data from 106 studies (90 papers) conducted in 23 different countries to examine 13 motivational factors associated with ACC. They found negative affect, perceived self-efficacy and outcome efficacy related to ACC.

## 2. Study 1

In this study we used two measures of ACC to examine the reliability of our findings across different measures. We were interested in demographic correlates of ACC, specifically age, gender and education, seeing if we could replicate findings from other papers. Thus, we predicted men more than women (H1); older more than younger (H2) and less rather than more educated people (H3) would be more sceptical. We were also interested in ideological variables, namely religious and political beliefs which are usually themselves related: more religious people tend to be more politically conservative. We expected that more religious people (H4) and more politically conservative people (H5) would more likely be climate sceptics, less happy to accept that climate change is as serious problem and mainly the result of human impacts on the planet.

In this study we also examined three “belief systems” to see how they impacted on beliefs about climate change. First, we examined *self-evaluations* following from the review of Valkengoed and Steg (2019) who found self-efficacy related to adaptation beliefs in the sense that the negative effects of climate change can and should be avoided. As self-efficacy is related to self-confidence and self-esteem (Furnham & Cheng, 2022) we investigated the relationship between a simple measure of SE and ACC. We hypothesised that those with higher self-esteem would be more agentic and activist in their ACC (H6).

Second, we examined *Belief in a Just World (BJW)* which is concept about the tendency of people to blame victims of misfortunes for their own fate. Two important reviews have appeared (Furnham, 2003; Hafer & Begue, 2005) in this area of research, which attracts 30–50 published papers a year. The idea is that people have fundamental need to believe that the (social) world is a just place and that this belief is functionally necessary for them to develop principles of deservingness. People are confronted with difficult issues like why some people get ill, are abused, descend into poverty etc. while others do not, and may be recipients of fortune. (Furnham, 2022). We hypothesised that those with high BJW would be more fatalistic about climate change (H7).

Thirdly, we examined the role *Conspiracy Theories (CTs)* in ACC. CTs entail the beliefs that the causes of many major social, political and economic events are because of the action of multiple, evil, secretive people with a selfish, global political goal in mind (Jolley, Douglas, 2014a, 2014b). They seem to form a *monological* belief system (Walter & Drochon, 2020) in the sense that people have a *conspiracist worldview*. They accept and integrate new CTs on a wide range of issues, and accept often strange, new and outlandish CTs because they serve a psychological function for people who feel powerless, excluded or disadvantaged (Furnham, 2022). They could be seen as superstitious, magical, and paranormal beliefs with no credible scientific evidence for them. We assumed that people with CT beliefs would see climate change as a “plot” by groups who want to change our lifestyle and are therefore more likely to deny its existence (Douglas & Sutton, 2015) (H8).

Fourth, we examine the relationship between *intelligence (IQ)* and ACC. Much of the ACC debate concerns the evaluation of evidence,

which is complex and debatable. It is claimed that most climate scientists have good evidence of global warming and a major cause being human activity, including the burning of fossil fuels, intensive farming and over-population. Whilst there are scientists who challenge this position, it appears that an articulate majority accept it. We assumed that more intelligent people would agree with the scientists warning about climate change, though it appears no studies have looked at IQ and ACC (H9).

### 2.1. Method

#### 2.1.1. Participants

There were 500 participants: 254 men and 248 women. They ranged in age from 30 to 69 with a modal age of 36 years. In all, 70.9 % were graduates. With regard to their religious beliefs (1 = *Not at all* to 9 = *Very*) they scored a mean of 3.80 ( $SD = 3.01$ ). In all 41.3 % said they did, and 58.7 % said they did not, believe in an afterlife. They rated their political views from 1 = *Very Conservative* to 9 = *Very Liberal* with a mean of 5.83 ( $SD = 1.81$ ). They rated “I am an optimist” from 10 = *Agree* to 1 = *Disagree* with a mean of 6.74 ( $SD = 2.15$ ).

#### 2.1.2. Questionnaires

2.1.2.1. *Attitudes towards climate change (Dias et al., 2020)*. This a short 5-item questionnaire (see Table 1). The test was validated on over 1200 Portuguese participants and attitudes shown to be significantly and predictably related to age, education, work status and personal values.

2.1.2.2. *Climate change attitude survey (Christensen & Knezek, 2015)*. This is a simple 15-item questionnaire (see Table 2). Using a large American population, the scale was demonstrated to have both reliability and validity (content, concurrent and criterion-related). Criterion validity was assessed by correlation with other attributes (such as “wanting to make the world a better place”). The results suggest the scale has two factors, representing beliefs and intentions. It has been cited over 30 times and been used in other studies (Christensen & Knezek, 2016).

2.1.2.3. *Self-esteem*. There were four ratings on a scale from 1 to 100: Physical Attractiveness ( $M = 62.16$ ;  $SD = 19.23$ ), Physical Health ( $M = 69.07$ ,  $SD = 18.18$ ), Intelligence (IQ) ( $M = 73.09$ ,  $SD = 13.49$ ) and Emotional Intelligence ( $M = 72.81$ ,  $SD = 17.01$ ). The alpha for these four items together was .73 and they were summed together forming a variable labelled Self-Esteem (Tables 3 and 7).

2.1.2.4. *Conspiracy thinking (Walter & Drochon, 2020)*. This was a 10-item scale devised as part of the Conspiracy and Democracy project at

**Table 1**  
Descriptives of attitudes towards climate change (Study 1).

	Mean	SD	Fac
Do you think the global climate is changing? 1 (for sure, yes) to 4 (for sure, no)	1.35	0.76	−0.46
Do you think that CC are caused by natural factors, human action or both? 1 (exclusively natural factors) and 5 (exclusively human factors)	3.71	0.83	0.65
To what extent do you feel you have a personal responsibility to try to reduce CC? 0 (nothing) and 10 (a lot)	7.80	2.35	0.79
How concerned are you with CC? 0 (nothing) to 5 (extremely)	3.89	0.95	0.82
To what extent do you think CC will have a good or bad impact on people around the world? 0 (extremely bad) to 10 (extremely good)	3.05	2.26	−0.52
If many people around the world reduce their energy consumption, to what extent do you think it is likely to decrease CC? 0 (not likely) and 10 (extremely likely)	7.12	2.49	0.64

**Table 2**  
Descriptives of gender differences for *Climate Change Attitude Survey (Study 1)*.

		Mean	SD	F	Sig.
1.I believe our climate is changing	Men	7.11	1.27	0.389	0.533
	Women	7.18	1.29		
2.I am concerned about global climate change	Men	6.46	1.69	2.502	0.114
	Women	6.70	1.61		
3.I believe there is evidence of global climate change	Men	6.98	1.36	0.483	0.488
	Women	7.07	1.36		
4.Global climate change will impact our environment in the next 10 years	Men	6.76	1.57	6.401	0.012
	Women	7.09	1.33		
5.Global climate change will impact future generations	Men	7.31	1.22	1.927	0.166
	Women	7.46	1.04		
6.The actions of individuals can make a positive difference in global climate change	Men	5.85	1.91	8.146	0.004
	Women	6.31	1.70		
7.Human activities cause global climate change	Men	6.59	1.64	0.387	0.534
	Women	6.69	1.63		
8.Climate change has a negative effect on our lives	Men	6.78	1.54	0.009	0.924
	Women	6.77	1.58		
9.We cannot do anything to stop global climate change	Men	2.98	1.97	4.965	0.026
	Women	2.59	1.89		
10.I can do my part to make the world a better place for future generations	Men	6.12	1.74	7.041	0.008
	Women	6.52	1.66		
11.Knowing about environmental problems and issues is important to me	Men	6.41	1.50	1.435	0.231
	Women	6.57	1.55		
12.I think most of the concerns about environmental problems have been exaggerated	Men	3.23	2.06	10.151	0.002
	Women	2.65	2.01		
13.Things I do have no effect on the quality of the environment	Men	3.54	1.97	14.747	0.000
	Women	2.88	1.88		
14.It is a waste of time to work to solve environmental problems	Men	2.18	1.67	5.491	0.020
	Women	1.85	1.48		
15.There is not much I can do that will help solve environmental problems	Men	3.56	2.05	17.260	0.000
	Women	2.81	1.99		

**Table 3**  
Factor analysis (varimax rotation) of the 15 items of the *Climate Change Attitude Survey (Study 1)*. **Bold loadings are those >.40**

	1	2	3
CLC5	<b>0.832</b>	-0.248	0.161
CLC3	<b>0.805</b>	-0.256	0.202
CLC1	<b>0.799</b>	-0.207	0.080
CLC4	<b>0.782</b>	-0.146	0.301
CLC7	<b>0.763</b>	-0.189	0.267
CLC8	<b>0.761</b>	-0.132	0.291
CLC2	<b>0.676</b>	-0.210	0.470
CLC12	-0.341	<b>0.740</b>	0.090
CLC13	-0.011	<b>0.735</b>	-0.275
CLC14	-0.352	<b>0.717</b>	-0.110
CLC9	-0.225	<b>0.645</b>	-0.117
CLC10	0.291	-0.127	<b>0.760</b>
CLC6	0.372	-0.121	<b>0.746</b>
CLC11	0.501	-0.091	<b>0.596</b>
CLC15	0.023	0.586	<b>-0.594</b>
Eigenvalue	7.286	1.656	1.210
Variance	48.571 %	11.039 %	8.067 %

the University of Cambridge. It consisted of 10 statements that are generic in nature and not connected to any specific societal, economic or political systems. People note those they believe to be true. In this study Cronbach's alpha was 0.68. with a mean of 2.01 (SD = 1.77).

**2.1.2.5. Belief in a just world.** Rubin and Peplau (1975) devised a 20-item self-report inventory to measure the attitudinal continuity between the two opposite poles of total acceptance and rejection of the

notion that the world is a just place. The scale has been quoted over 650 times in the academic literature. Because some items were both dated and country specific, 6 were removed, leaving 9 Just World and 4 Unjust World items remaining. Cronbach's alpha in this study for the Just World was 0.88 and 0.82 for the Unjust World. Most other measures that assess the BJW are very short, and it was anticipated that removing these items would make little difference to the validity of the test (Furnham, 1998).

**2.1.2.6. The Wonderlic Personnel Test (Wonderlic, 1990).** This 50-item test can be administered in 12 min and measures general intelligence. Items include word and number comparisons, disarranged sentences, story problems that require mathematical and logical solutions. The test manual provides of test reliability and validity and shows it correlates very highly ( $r = 0.92$ ) with the well-known and respected Wechsler scale (WAIS-R). In this study we used 16 of the 50 items from Form A. Choice of items was based on the ability of putting these on the Prolific platform and their increasing level of difficulty. The Alpha of these was 0.85.

**2.1.3. Procedure**

Departmental ethical approval was gained prior to data collection (CEHP/514/2017). Data was collected on-line through Prolific, a platform like the better-known Amazon-Turk. We specified that participants needed to be over 30 years, working and be fluent in English. We did so to prevent the sample being strongly skewed to young people many of whom were at university: i.e., a typical student population. Participants came from all over Europe (Germany, Portugal, Spain) while the majority from Great Britain. Participants were compensated for their time at the prescribed rate (receiving £2.50). They took around 10 min to complete the task. Usual data cleansing and checking for missing data, very short completion times and patterned responses led to around 3 % of the participants recruited being rejected before further analysis. We report the results from all the measures we used. A sample size indicator suggested a population of 500 would exceed requirements to ensure a 95 % confidence rate.

**2.2. Results**

Table 1 shows the results from the first ACC (Dias et al., 2020) measure. The items were subjected to a principal components and factor analysis. They all loaded on one factor with two negative and four positive items. High scores indicate the person endorses an “activist” and low scores a “denialist/sceptical” position. These were summed into a single score with an alpha of 0.78. This score was correlated with all other variables, two were  $r > 0.10$ : Politics ( $r = 0.33$ ) and Optimism ( $r = 0.15$ ), showing left-wing/liberal, optimists were more likely to be activists with higher scores.

Table 2 shows the results of the gender differences in all 15 items in the second CCAS (Christensen & Knezek, 2015) measure. Around half showed significant difference and six at  $p < .001$ . They were consistent and showed that females took climate change more seriously and believed they could and should try to do something about it.

The longer scale was subject to a varimax factor analysis. Unlike the factor analysis in the original paper where two factors emerged, in this study we found three factors which accounted for over two-thirds of the variance. They were labelled *Impact, Fatalism and Personal Action*. These were correlated with the first measure (ACC) and the shown correlations of  $r = 0.72, -0.49$  and  $0.56$  respectively.

Table 4 shows the results of the correlational analysis. They showed females were more likely to endorse fatalistic ACC (factor 2); religious, optimistic, after-life believers and high self-esteem people endorsed more the personal action ACC. However, there was no support for H2 and H3 which hypothesised that age and education would be related to ACC. Both Just World and Conspiracy theories were correlated with two of the three ACC factors. However, the strongest were Liberals, who endorsed more the Impact and Social Action factors and less than those

**Table 4**  
Correlational results between the variables. Bold Correlations are the focus of this paper.

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
(1)Gender	1.49	0.50													
(2)Age	37.96	8.02	0.00												
(3)Degree	1.29	0.46	-0.02	0.21***											
(4)Religious	3.80	3.01	0.04	0.02	0.06										
(5)Politics	5.83	1.81	0.13**	-0.03	-0.07	-0.23***									
(6)Optimist	6.74	2.15	0.09*	0.10*	0.03	0.20***	0.01								
(7)Afterlife	1.59	0.49	-0.11*	-0.05	-0.10*	-0.50***	0.12**	-0.22***							
(8)Self-Esteem	276.8	50.71	-0.03	0.02	-0.11*	0.17***	0.00	0.36***	-0.10*						
(9)BJW	14.86	10.16	-0.17***	0.04	0.02	0.04	-0.14**	0.27***	-0.03	0.21***					
(10)Conspiracy	2.02	1.77	0.11*	-0.05	0.09	0.41***	-0.23***	0.08	-0.28***	0.00	-0.02				
(11)Fac1: Impact	48.48	8.48	0.06	-0.03	-0.04	-0.05	0.37***	0.04	0.05	0.05	-0.06	-0.06			
(12)Fac2: Fatalism	10.96	5.75	-0.17***	-0.07	0.06	0.07	-0.36***	-0.01	-0.06	-0.03	0.15***	0.16**	-0.52***		
(13)Fac3: Pers Act	22.06	3.72	0.04	-0.01	-0.02	0.12**	0.18***	0.17***	-0.10*	0.12*	0.11*	0.11*	0.61***	-0.17***	
(14)IQTot	10.27	2.83	-0.15***	0.05	-0.14**	-0.25***	0.08	-0.11*	0.19***	0.04	0.03	-0.36***	0.01	-0.14**	-0.08

who were more politically conservative.

Table 5 shows the results of three regressions with the three attitudinal factors serving as the criterion variable. This analysis was repeated on the totalled score for the first short measure assessing the single Activist-Denialist. The pattern is clear: each regression was significant and between 8 and 16 % of the variance was accounted for; it was very clearly political beliefs that accounted for most of the variance.

For Table 5 (overall multiple regressions with 11 predictors and using the three derived factor scores as criterion variables) the lowest observed  $R^2$  value (actually adjusted  $R^2$ ) is 0.08. Running a post hoc power analysis using Cohen's  $f^2 = 0.08696$  (which is defined as  $\frac{R^2}{1-R^2}$  so  $\frac{0.08}{1-0.08}$ ) and with  $\alpha = 0.05$  and  $N = 504$ , the power to detect an effect with magnitude  $R^2 = 0.08$  is 0.9988. Further, a G\*Power sensitivity analysis reveals that with  $\alpha = 0.05$ ,  $1 - \beta = 0.80$ , and  $N = 504$ , an effect of  $f^2 = 0.035$  can be detected – which is a small to medium effect using Cohen's (1988) criteria. With respect to a single regression coefficient in this model containing 11 predictors, G\*Power's sensitivity analysis indicates that with  $\alpha = 0.05$ ,  $1 - \beta = 0.80$  and  $N = 504$ , and for a 2-tailed test,  $f^2 = 0.0156$  – which is a very small effect size using Cohen's criteria. A similar sensitivity analysis for bivariate correlations with  $\alpha = 0.05$ ,  $1 - \beta = 0.80$  and  $N = 504$ , and for a 2-tailed test,  $\rho_{H1} = 0.1244$ . Thus, with the standard 5 % significance level, a sample size of 504 gives an 80 % chance of detecting a bivariate correlation in the population = 0.1244.

### 2.3. Discussion

One contribution of this study was to investigate different factors of ACC. The first factor concerns accepting the fact of change and its impact on the whole world. The second was a mixed of fatalism and denying all personal responsibility, while the third was about the usefulness of personal action. It may well be that there are two distinct dimensions in this area: accept vs reject the idea of climate change, and being agentic vs fatalistic in reacting to it. Obviously if one rejects the idea of “human-made” climate change there seems little point in trying to change behaviour to reduce it, yet there may well be fatalistic acceptors who believe efforts of change behaviour sufficiently to avoid major problems are unlikely to succeed.

It is interesting to note from both the correlational and regression analyses that, apart from political beliefs, all the variables were weak correlates of the three factors. Gender ( $r = -0.17$ ) and religion ( $r = 0.12$ ) were significant with one of the three factors, while age and education showed no significant correlates. Of the three attitudinal factors it was the third, that referred most to individual responsibility and action, that was correlated with most other variables.

Whilst religion and politics were correlated as expected (more religious people were more politically conservative), there was little evidence that religious beliefs (including belief in the after-life) was related to ACC. The BJW and CT scores did correlate with fatalistic beliefs indicating that the more people endorsed the idea of a just world (you deserve what you get) and general conspiracy theories.

Surprisingly IQ was not strongly related to ACC, except the second factor concerning fatalistic beliefs. The IQ score was significantly correlated with other scores such as education, religious beliefs and the rejection of CTs, though it was not closely related to ACC. This is surprising because in acrimonious debates both sides accuse the other of ignorance.

The clearest finding was the role of political beliefs which was true of both measures. Climate change is a political issue because of arguments suggesting what must occur to combat it. Many of these are very radical concerning such things as all forms of transportation, food and energy production.

We therefore set about a semi-replication on a similarly large and diverse population. We replicated three sets of individual difference variables (demographic; ideological, and self-ratings) whilst using a

**Table 5**  
Regressions with the three factor scores as criteria.

	Fac1: Impact				Fac2: Fatalism				Fac3: Personal Action				Short CC			
	B	SE	Beta	t	B	SE	Beta	t	B	SE	Beta	t	B	SE	Beta	t
Gender	0.20	0.76	0.01	0.26	-1.57	0.50	-0.14	-3.17**	0.00	0.34	0.00	0.00	0.60	0.56	0.05	1.06
Age	-0.01	0.05	-0.01	-0.18	-0.07	0.03	-0.09	-2.19*	-0.00	0.02	-0.01	-0.16	0.02	0.04	0.03	0.63
Degree	-0.29	0.83	-0.02	-0.35	0.41	0.55	0.03	0.74	-0.24	0.38	-0.03	-0.63	-0.49	0.62	-0.04	-0.79
Religious	0.12	0.15	0.04	0.79	-0.14	0.10	-0.07	-1.41	0.10	0.07	0.08	1.46	0.24	0.11	0.11	2.15*
Politics	1.74	0.21	0.37	8.17***	-0.95	0.14	-0.30	-6.75***	0.50	0.10	0.24	5.22***	1.18	0.16	0.34	7.45***
Optimist	0.08	0.19	0.02	0.42	-0.05	0.13	-0.02	-0.42	0.13	0.09	0.07	1.45	0.19	0.14	0.07	1.35
Afterlife	0.45	0.86	0.03	0.52	-0.37	0.57	-0.03	-0.65	-0.30	0.39	-0.04	-0.78	-0.48	0.64	-0.04	-0.75
Self-esteem	0.01	0.01	0.04	0.85	-0.00	0.01	-0.03	-0.73	0.00	0.00	0.05	1.04	-0.21	0.11	-0.09	-2.01*
BJW	-0.03	0.04	-0.03	-0.64	0.06	0.03	0.10	2.31*	0.04	0.02	0.10	2.22*	0.00	0.01	0.03	0.60
Conspiracy	0.10	0.24	0.02	0.84	0.24	0.16	0.07	1.54	0.24	0.11	0.11	2.23*	0.02	0.03	0.03	0.64
IQTot	-0.02	0.14	-0.01	-0.13	-0.25	0.09	-0.12	-2.65**	-0.05	0.06	-0.04	-0.77	-0.26	0.18	-0.07	-1.47
Adjusted R <sup>2</sup>	0.12				0.16				0.08				0.13			
F	7.13				9.60				4.91				7.52			
p	0.000				0.000				0.000				0.000			

\*\*\* p < .001.  
\*\* p < .01.  
\* p < .05.

single item assessing ACC.

### 3. Study 2

It is always a good idea to replicate findings on different groups perhaps using slightly different measures. We had the opportunity to do a part replication and extension. In the second study we again examined demographic and ideological correlates of ACC. However, in this study we use a simple, single item measure of ACC to see whether we could replicate some of the above findings, specifically the role of political beliefs. In this study we had similar demographic (gender, age, education), ideological (political and religious beliefs) and the self-esteem variable.

However, we also added a social comparison variable; we asked people a set of questions about how they compared to others. Social comparison processes can be seen as another way of measuring self-worth and self-esteem. Similar to study one, we predicted demographic, ideological and self-esteem correlates with ACC, measured by our question on global warming.

#### 3.1. Participants

A total of 504 participants completed the questionnaire: 254 were men and 249 were women. They ranged from 20 to 73 years old, with a mean age of 38.42 years (SD = 8.36). About 70 % were graduates. In total, 33.9 % were single and 44.2 % married, with 45.4 % having no children. They are rated themselves on two scales: "How religious are you?" (Not At All = 1 to Very = 8) (M = 3.73, SD = 3.07) and "How would you describe your political beliefs?" (Very Conservative = 1 to Very Liberal = 8) (M = 5.87, SD = 1.79).

#### 3.2. Questionnaires

##### 3.2.1. ACC

They were also asked "How seriously do you take Global Warming" on a response scale from 1 = Not at all to 9 = Very much so, with a mean of 7.01 (SD = 1.80).

##### 3.2.2. Self-ratings

They rated themselves on four scales from 0 to 100: Physical Attractiveness (M = 60.83, SD = 19.02), Physical Health (M = 68.89, SD = 19.26), Intelligence (M = 73.04, SD = 14.08), and Emotional Intelligence (M = 71.24, SD = 18.48). These were combined into a single score with an Alpha reliability of 0.75.

#### 3.2.3. Social comparisons

We asked the following "Compared to others of your own age, stage and background, to what extent do you think you are more or less... (Much less = 1 to Much more = 9): A good driver (M = 6.06, SD = 2.39), A risk taker (M = 5.04, SD = 2.04), Physically healthy (M = 6.11, SD = 1.84), Have a strong sex drive (M = 5.52, SD = 2.08), A good listener (M = 7.01, SD = 1.63), Prone to depression (M = 4.45, SD = 2.39), Ambitious at work (M = 5.96, SD = 1.97) and Emotionally resilient (M = 6.48, SD = 1.67). These were combined into a single score with an alpha of 0.61.

#### 3.3. Procedure

As in the first study.

#### 3.4. Results

Table 6 shows the correlations between the variables. The three variables were significantly correlated with our question about global warming concerns. They showed that more conservative people with lower scores on self-ratings and social comparisons were less concerned with global warming.

As in the first study we performed a regression using the ACC question as the criterion variable. The results show that two factors were significant: political beliefs and self-ratings/esteem accounted for just over 10 % of the variance.

#### 3.5. Discussion

This modest study part replicated the first using a single measure of ACC, but similar measures of individual differences. The results were clear: just as in the first study which has two ACC measures, this one showed a strong relationship between political beliefs and ACC. Those who claimed to be more politically conservative indicated that they took global warming less seriously than those who indicated they were more politically liberal. This has also been found in different studies done in different countries (Krange et al., 2019; McCright & Dunlap, 2011).

There was also an indication that those with lower self-esteem ratings were less concerned with global warming, perhaps because they felt more powerless and had other issues to deal with.

### 4. General discussion

As is apparent from public demonstrations, social media messages and the mass media, ACC is an increasing hot topic and one which

**Table 6**  
Correlations between demographics, ideology, self-ratings and concern with global warming.

	Mean	SD	1	2	3	4	5	6	7
(1) Gender	1.50	0.50							
(2) Age	38.47	8.36	0.02						
(3) Degree	1.30	0.46	-0.09	0.17***					
(4) Religious	3.75	3.07	0.10*	0.03	-0.02				
(5) Politics	5.87	1.76	0.00	-0.05	-0.13**	-0.21***			
(6) Self	274.05	54.17	0.06	-0.04	-0.25***	0.23***	0.05		
(7) Compare	48.56	8.38	-0.05	-0.08	-0.08	0.24***	-0.02	0.51***	
(8) Global warming	7.01	1.81	0.03	0.05	-0.09*	0.04	0.27***	0.20***	0.15**

\*\*\* p < .001.  
\*\* p < .01.  
\* p < .05.

**Table 7**  
Regressions with concerns with global ratings as the criterion \*p < .05; \*\*p < .01  
\*\*\*p < .001.

	B	SE	Beta	t
Gender	0.18	0.17	0.05	1.06
Age	0.02	0.01	0.07	1.47
Degree	-0.12	0.19	-0.03	-0.61
Religious	0.03	0.03	0.05	0.94
Politics	0.27	0.05	0.27	5.72***
Self	0.00	0.00	0.12	2.24*
Compare	0.02	0.01	0.10	1.89
Adjusted R <sup>2</sup>	0.109			
F	8.731			
p	0.000			

attracts a great deal of attention. Whilst these studies did not use fully representative samples, they did indicate that most people tend to the activist end of the ACC spectrum: that is the accept climate change and see it as predominantly “man-made”. Nevertheless, there is still and sufficient spread of beliefs to investigate our hypotheses.

The results from both studies suggested that gender, age, education and religious beliefs were not strongly associated with ACC but clearly demonstrate the relationship between political beliefs and ACC. Despite using three different measures of ACC in the two studies, the results showed that of all the variables we considered by far the most powerful and consistent was political beliefs. Those rated themselves as more conservative were more likely to be climate sceptics. Whilst this result would not surprise many, perhaps what is most interesting is the power of this single variable over and above the many we measured. By and large these results concur with other related studies in different countries (Krange et al., 2019; McCright & Dunlap, 2011).

In both studies we used both correlational and regression analyses. Whilst the correlations indicated many variables associated ACC the regressions gave a clearer picture identifying very clearly the role of political beliefs.

Climate change is clearly more an ideological issue than anything else. Liberal as opposed to politically conservative people accept the idea that climate change is real and primarily man made whilst conservatives reject this view. As a consequence, the former advocate a range of radical changes in society while the latter strongly reject them. Perhaps it is this factor that accounts for the finding: that is, because the “solutions” to climate change are so radical, conservatives find it easiest to reject the possible cause. This hypothesis may be tested by asking people about the beliefs in the efficacy and indeed morality of climate change interventions.

Douglas and Sutton (2015) suggest that ACC deniers may be considered conspiracy theorists. They suggest that climate conspiracy theorists believe that climate scientists and politicians are distorting or hijacking the science for their own agenda. Moreover, more than the many other conspiracy theories, those concerning climate change seem more politically loaded, dividing opinion across the left-right

continuum.

It is interesting in the first study that the measure of CT, used in many other studies (Furnham, 2022), did not correlate significantly with two factors and was significant in only one regression. This may be because there is a difference between climate change cynics and sceptics; the former of which are likely to embrace a wide range of theories while the latter are very specific. There are also a number of spokespeople for the sceptic position that are clearly not conspiracy thinkers or activists.

These results raise issues about the change of ACC beliefs. There are a number of individuals and organisations that hope to convert people to their cause as regards ACC. They usually do so by the presentation of data of varying quality and complexity. They face a very similar problem to those eager to reduce CTs. Cichocka (2020) argued that three broad psychological needs underlie conspiracy beliefs: the need to understand the world, to feel safe, and to belong as well as feel positive about oneself and one's social groups. She argues that we should not abandon other methods of correcting misinformation and stemming its spread. Debunking is extremely difficult, but ‘Prebunking’ is more effective and involves warning people that they might encounter misinformation before they accept it. It would appear that there are still relatively few studies on the efficacy of methods to modify ACC.

Given these findings it would be interesting to trace politicians in various countries assertions about climate change and the way these have changed over time. It is now 60 years since Carson's (1962) famous popular book *Silent Spring* was published and which is still quoted by both sides in the argument.

Like all others this study had limitations. Given the relevance of ideology, particularly political beliefs, it would have been desirable to have explored in much more detail a participants' political beliefs, knowledge and past political behaviour, like voting, party membership and active participation in campaigns. However, there is evidence that this one item personal rating is consistently and logically related to other belief systems (Furnham & Robinson, 2021). The mean score (and standard deviation) in both samples was very similar and indicated most of these younger and better educated people tended to be more politically liberal than conservative.

It would also be of interest to explore knowledge of, as well as attitudes to, climate change: that is what facts and data people know or choose to quote on these issues. This would no doubt be related to their media preferences and consumption. Our sample was clearly not representative of a general (European) population, being younger and better educated. They tended to be more left-wing/liberal, with scores being around 6 out of 8 on this dimension, with an SD of around 2. It would be interesting given the results to seek out larger groups from different ends of the political spectrum, though it is not clear if the results would be much different.

In conclusion this study underlined the role of political beliefs in climate change beliefs (Conversi & Hau, 2021). Despite examining a wide range of other demographic, ideological and belief factor it seems that political persuasion is by far the major correlate of ACC. This provides useful information for those trying to change the publics ACC. On

the other hand, it is important to acknowledge the nature of the sample and the measures we used to conclude that political beliefs are necessarily the major determinant of all aspects of a person's ACC.

### Ethics approval

UCL Psychology Dept number CEHP/514.2013 granted permission for this study to be done.

### Registration

This paper was not pre-registered with the journal.

### Ethics

This was sought and obtained (CEHP/514/2017).

### Informed consent

Participants gave consent for their anonymised data to be analysed and published.

### CRediT authorship contribution statement

A.F: Visualisation, Writing -review  
C.R: Data curation; analysis

### Declaration of competing interest

There is no conflict of interest in this research or paper.

### Data availability

This is obtainable from the first author upon request.

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