Promoting pro-environmental action in climate change deniers

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A sizeable (and growing) proportion of the public in Western democracies deny the existence of anthropogenic climate change[1,2]. It is commonly assumed that convincing deniers that climate change is real is necessary for them to act pro-environmentally[3,4]. However, the likelihood of 'conversion' using scientific evidence is limited because these attitudes increasingly reflect ideological positions[5,6]. An alternative approach is to identify outcomes of mitigation efforts that deniers find important. People have strong interests in the welfare of their society, so deniers may act in ways supporting mitigation efforts where they believe these efforts will have positive societal effects. In Study 1, climate change deniers (N = 155) intended to act more pro-environmentally where they thought climate change action would create a society where people are more considerate and caring, and where there is greater economic/technological development. Study 2 (N = 347) replicated this experimentally, showing that framing climate change action as increasing consideration for others, or improving economic/technological development, led to greater pro-environmental action intentions than a frame emphasizing avoiding the risks of climate change. To motivate deniers' pro-environmental actions, communication should focus on how mitigation efforts can promote a better society, rather than focusing on the reality of climate change and averting its risks.

Enormous effort has been devoted to convincing the public that anthropogenic climate change is real. However, these attempts are increasingly failing—since 2008 the number of deniers of anthropogenic climate change has climbed to one-third or more of the population in high-carbon-emitting countries such as the United States and Australia[1,2,7]. As widespread acceptance of the reality of anthropogenic climate change is considered critical to effective responses[3,4], public scepticism about anthropogenic climate change is seen as an important obstacle to meeting the climate change challenge[3,8].

A natural response to this challenge is to highlight how deniers are being misled (for example, by media reporting norms and institutions with vested interests[6,9,10]), and to redouble efforts to convince the public of the reality of anthropogenic climate change[3,4]. Assuming that denial results from deception, ignorance or misunderstanding, change agents intuit that the answer lies in presenting the evidence for climate change in clearer, more cogent and more convincing ways[4]. However, this intuitive strategy may not be effective[11], because believers and deniers evaluate the evidence for climate change using different frameworks[12]. Rather than emerging organically from evidence, many attitudes represent public, cultural expressions of a person's values and political and ideological allegiances[13]. Where, for identity reasons, people are motivated to hold a certain attitude, discrepant evidence is more likely to be avoided, dismissed as biased or judged against an unrealistically high burden of proof, whereas evidence supporting a pre-existing attitude is evaluated with little criticism[14].

Disturbingly for environmentalists, attitudes towards climate change and climate science seem to have become part of a constellation of attitudes defined by the 'culture wars': one may have little more luck of convincing a denier that climate change is real as of convincing a conservative Christian to support abortion, or a committed liberal to oppose it. If taken to its pessimistic extreme, it suggests that activists should give up on deniers and focus on increasing pro-environmental behaviour in climate change believers. This is the implicit message sent by social science research on environmental communication; we are aware of no studies that have explicitly focused on how to promote pro-environmental behaviour among deniers. We argue that this theoretical and empirical silence is a mistake for two reasons. First, the numbers of deniers are now too great to ignore[1,2]. Second, motives to engage in behaviours are often multiply determined, so deniers might be motivated to act in ways that support mitigation efforts for reasons that do not rely on accepting climate change science.

This is the first study to examine how pro-environmental behaviours can be promoted among those who are anthropogenic climate change deniers. In line with increasing recognition that climate change 'is as much a societal issue as a physical one'[15,16], our framework focused on deniers' beliefs about the effects of widespread mitigation efforts on their nation and its people, and how these were related to their intentions to engage in environmental citizenship[17]. Environmental citizenship is recognized as an important behaviour in addressing climate change[18–20], including supporting pro-environmental organizations and individuals (for whom climate change is likely to be a key concern), and contributing to public pressure for political action (signing petitions, writing to politicians and newspapers).

It has been recognized that acting on climate change can produce 'co-benefits' such as promoting sustainable development and improving health[21]. Far less attention has been paid to the 'identity' benefits of acting on climate change, which may be important for both believers and deniers. Social psychologists have shown that people have a deep concern with their group being seen as interpersonally warm, competent and moral[22–24]. People typically also want to live in a society with strong societal development (for example, scientific progress and economic growth) and minimal dysfunction (for example, crime and poverty). We predicted that deniers may be motivated to engage in pro-environmental action where they think climate change action would result in people becoming more moral, interpersonally warm and competent, and where action would lead to greater societal development or reduced societal dysfunction. These

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Table 1 | Summary of measures (Study 1).

Construct	Items	Scale	Reliability*
Criterion			
Environmental citizenship	Vote for pro-environmental candidates; sign petitions supporting environmental protection; write to politicians/newspapers in support of environmental protection; donate to environmental organizations; read environmental publications; join environmental groups	1 Not at all likely 5 Very likely	0.88
Predictors			
Personal characteristics			
Interpersonal warmth	Considerate; warm	−5 Much less typical in society in 2050 than today	0.74
Competence	Independent; capable		0.68
Morality	Trustworthy; honest	0 No different to today	0.79
Society-wide characteristics			
Societal dysfunction	Violent crime; corruption; poverty; disease		0.82
Societal development	Technological progress; scientific progress; Financial wealth; economic development	+5 Much more typical in society in 2050 than today	0.89

*For two-item scales, correlations are reported. For other scales, Cronbach's alpha is reported.

Table 2 | Predictors of environmental citizenship for climate change deniers (Study 1).

	Mean (s.d.)	Beta	t-value	p
Interpersonal warmth	−0.21 (2.26)	0.33	2.34	0.020
Competence	0.00 (2.27)	0.03	0.24	0.809
Morality	−0.48 (2.21)	−0.08	−0.68	0.495
Societal dysfunction	0.60 (2.18)	−0.04	−0.56	0.577
Societal development	0.13 (2.22)	0.32	3.83	<0.001

Model: $R^2 = 0.28$, $F(5,148) = 11.32$, $p < 0.001$.

consequences of taking action need not depend on climate change actually being mitigated.

Study 1 examined basic relationships between beliefs about these social consequences of climate change action and environmental citizenship intentions. Data from 155 climate change deniers from the general public were identified through a larger survey ($N = 488$; see Supplementary Information for selection criteria and demographic analyses). We asked participants how their nation would be different in 2050 if widespread action to mitigate climate change was taken from the present year (2011), a time frame chosen to mirror common climate change projections (for example, Intergovernmental Panel on Climate Change reports[25]). We measured the extent to which climate change action would influence people's character, including interpersonal warmth (being caring and friendly to others), competence (having the capacity and skills to achieve goals) and morality (being virtuous and trustworthy). At a broader societal level, we assessed societal dysfunction (for example, crime and poverty), and societal development (for example, economic and scientific progress). Table 1 describes the measures, and Table 2 shows mean ratings. Ratings spanned both positive and negative endpoints on all scales, indicating a wide range of views across individuals.

Regression analysis was used to determine relationships between these projections about societal change and deniers' environmental citizenship intentions. This model (Table 2) showed that environmental citizenship intentions were greater where deniers believed action on climate change would result in people becoming more interpersonally warm and considerate, and where they thought climate change action would promote societal development.

Responses to an initial survey question, where deniers described their first thoughts about the consequences of acting on climate change, succinctly encapsulate these findings. Some pointed to economic benefits: "while I personally don't believe in climate change as a recent phenomenon, I do agree with reducing our carbon emissions … think of the possibilities that this would open to individuals and business alike, it would create jobs". Others pointed to mitigation efforts ultimately increasing consideration for others: "if we took action it would show we do care for the environment and therefore care for the human race" and "people would be more conscious of their impact on the environment and each other". In short, a substantial proportion of climate change deniers believed mitigation efforts would have positive effects on their nation and on people's character, and deniers who made more positive projections on these dimensions intended to act more pro-environmentally.

Study 2 examined whether framing climate change action in these ways (increasing interpersonal warmth and societal development) may be a more effective approach for motivating action in deniers than the more traditional focus on the reality and risks of climate change. Drawing on research showing that how issues are framed can influence public opinion[26], participants in this experiment read a statement, ostensibly from a previous research participant, about the outcomes of acting on climate change using one of three frames: the reality of climate change and how acting would avert its environmental and health risks (Real frame); climate change action would increase interpersonal warmth in society (Warmth frame); or climate change action would promote economic and scientific development (Development frame; see Supplementary Information). We expected that intentions to engage in environmental citizenship would be greater using the Warmth and Development frames than the Real frame. We also included people who believe in anthropogenic climate change, as we were concerned that focusing on interpersonal warmth and development may be counterproductive if it increased deniers' action intentions, but reduced believers' willingness to act.

Although environmental citizenship, such as joining/supporting pro-environmental organizations, could reasonably be seen to function as support for action on climate change, this link was not made explicit in Study 1. Therefore, in Study 2 participants
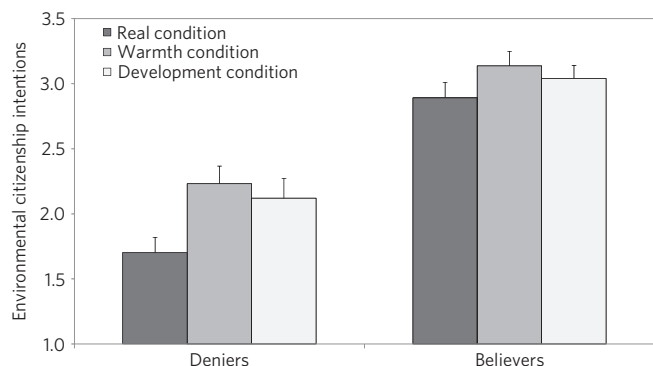
Figure 1 | Means (with standard errors) of environmental citizenship intentions across climate change action frames for climate change deniers and believers (Study 2).

were informed that addressing climate change was a key concern for many pro-environmental groups and individuals immediately before they made environmental citizenship ratings.

We obtained a nationally representative sample of the general public ($N = 347$; see Methods and Supplementary Information for details), who were randomly assigned to the experimental conditions. Mean environmental citizenship ratings ($\alpha = 0.92$) are shown in Fig. 1. Overall, Believers ($M = 3.03$, s.d. $= 0.96$) showed higher environmental citizenship intentions than Deniers ($M = 2.02$; s.d. $= 0.91$), $F(1,341) = 92.47$, $p < 0.001$. More importantly, there was significant variability across experimental conditions, $F(2,341) = 4.87$, $p = 0.008$, with post hoc comparisons showing a significant difference between the Real and Warmth frames ($p = 0.012$), and Real and Development frames ($p = 0.013$). We also compared conditions for Deniers alone, with significant differences between the Real and Warmth conditions ($p = 0.008$), and the Real and Development conditions ($p = 0.045$). Although Fig. 1 shows that the differences between conditions were smaller for Believers (differences were non-significant, all p values > 0.13), the pattern of means was similar, resulting in a non-significant interaction between group (Deniers, Believers) and frame (Real, Warm, Development), $F(2,341) = 0.77$, $p = 0.463$. These results show that, overall, framing climate change action in terms of producing greater interpersonal warmth or societal development was more effective in promoting environmental citizenship than a frame focusing on the reality and risks of climate change, and this was particularly the case for deniers.

Figure 1 shows that environmental citizenship intentions for deniers were below the scale midpoint, but Believers were only around the midpoint, giving a baseline comparison for reasonable expectations of change in deniers' citizenship intentions. Thus, framing climate change action using Warmth and Development frames bridged one-third of the gap in environmental citizenship intentions between the Real frame for Deniers and the average of Believers. It is remarkable that this substantial difference between the Real and the Warmth/Development conditions emerged from a relatively minor experimental manipulation—briefly reading the view of a single research participant. If coordinated social and media efforts were focused on these societal outcomes, the willingness of deniers to act in ways that support climate change action could be even greater.

Critics might speculate that focusing debates on societal outcomes of mitigation efforts could soon reach the same ideological impasse as for debates about the reality of climate change. Although there are no guarantees, there are reasons for optimism. Deniers are united in disbelieving in anthropogenic climate change, but many already believe that mitigation efforts can have positive effects on society. Ordinary citizens may

also find it easier to relate to how mitigation efforts affect society, compared with esoteric technical issues in climate change science[4,27]. Moreover, the consequences of climate change action on society are a concern shared by climate change deniers and believers, which may help circumvent ideological believer/denier labels in the service of common goals. Accordingly, Study 2 showed that these social frames for climate change action can foster intentions to act in deniers without harming the intentions of believers. Finally, this approach avoids some prominent counter-claims made by conservative think-tanks[28], including denying the existence of climate change, and the need to delay action until there are comprehensive international treaties.

Deniers may eventually be convinced by sustained efforts at communicating climate science, or through personal experiences attributable to climate change such as flooding[29]. However, the recent trend of increasing denial suggests that relying on 'converting' climate change deniers may not be a successful or timely strategy. Broadening the debate to encompass outcomes that are related to deniers' willingness to act, and which are already accepted by many deniers, may be more likely to foster the widespread consensus and support that governments need to enact effective mitigation policies. Communication about the reality of climate change should continue, but public discussion should broaden to encompass the societal effects of action, especially how mitigation efforts will promote scientific and economic progress, and can make us more caring and considerate people.

Methods

Study 1 data were collected in May–July 2011. From an overall sample of 488 people, a screening item asked whether participants (1) believed humans were contributing substantially to climate change, (2) believed climate change was occurring, but that humans were not contributing substantially to it, or (3) did not believe the climate was changing. Those who chose (2) ($n = 119$) or (3) ($n = 57$) were classified as climate change deniers ($n = 176$; 36% of total sample) and completed the survey. They first provided a short written description of what society would be like in 2050 if widespread action on climate change were to commence from 2011. Next, adapting an approach used previously to investigate the social effects of industrialization[30], they rated differences in the future society they described compared with today on the dimensions in Table 1. They then made environmental citizenship ratings. Twenty-one participants did not follow instructions as they failed to describe a future society, and their data were omitted, leaving a final sample of 155 (53% female).

Study 2 data were collected in February 2012. Participants ($N = 347$) completed an online questionnaire. Using the same question as Study 1 to classify deniers/believers, 37% of the sample were deniers ($n = 128$; 56% male; see Supplementary Information for further details and exclusions). Participants were randomly assigned by computer to one of three framing conditions (Real, Warmth, Development), reading a statement ostensibly from a previous research participant. They were asked to write a summary of the person's position, followed by the environmental citizenship scale and additional measures (reactions to the statement, identification with/typicality of the person making the statement, demographics).

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Author contributions

P.G.B. designed the studies, coordinated data collection, analysed the data and wrote the paper. M.J.H. contributed to the design and analysis of both studies and writing the paper. R.B. contributed to the design and analysis of Study 2 and writing the paper. C.J. contributed to the analysis of Study 1 and writing the paper.

Additional information

The authors declare no competing financial interests. Supplementary information accompanies this paper on www.nature.com/natureclimatechange. Reprints and permissions information is available online at www.nature.com/reprints. Correspondence and requests for materials should be addressed to P.G.B.