# Reducing, and bridging, the psychological distance of climate change

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Abstract

Science communication aims to motivate action on climate change. We examined the usefulness of two related communication strategies: *proximising* climate change with news focussing on local impacts, and *bridging* psychological distance by raising the salience of people's global identity as part of humanity. We first examined the often implicitly assumed process underlying proximising, namely reducing the psychological socio-spatial distance of climate change, which in turn might make the issue more relevant for people, which in turn might promote behavioural engagement. Second, we argued that when people consider themselves as part of a global society, proximising may not be necessary as people perceive the relevance of distant impacts. We conducted an experiment with UK residents ($N$ = 400) with two between subjects factors: proximity of communication on climate change (proximal or distant) and global identity salience (communicated or not). Communicating proximity (vs. distance) via a news text on climate change consequences for either the UK or Bangladesh reduced the psychological socio-spatial distance of climate change and indirectly predicted climate protective behaviour through lower psychological socio-spatial distance and higher relevance attribution. While these indirect relations were small, stronger relations might arise if people repeatedly receive local information. Participants for whom global identity was made salient (using a video showing a man dancing with people all over the world) exhibited no decreases in evaluating the relevance of the news text as their psychological socio-spatial distance of climate change increased (compared to those who viewed a control video). This indicates that global identity salience can bridge the psychological socio-spatial distance of climate change. We conclude that it is useful to report local consequences of climate change, or to communicate global connectedness if global consequences of climate change are described.

*Keywords*: Climate change, communication, psychological distance, global identity

# Reducing, and bridging, the psychological distance of climate change

## 1. Introduction

The majority of scientists express urgency in limiting climate change to secure the quality of life on Earth (Maibach, Myers, & Leiserowitz, 2014; Ripple et al., 2017). Science communication thus aims to motivate public climate protective actions. We examined the usefulness of two related communication strategies: *proximising* climate change (Brügger, Morton, & Dessai, 2016) with news focussing on local impacts; and *bridging* the psychological socio-spatial distance (Spence, Poortinga, & Pidgeon, 2012) by raising the salience of people's global identity as part of humanity (McFarland, Webb, & Brown, 2012; Reese, 2016).

## 2. Theoretical Background

### 2.1 Proximising Climate Change

Many people perceive climate change as a phenomenon that primarily impacts others in remote places (Milfont, 2010; Spence et al., 2012). *Proximising* climate change (Brügger et al., 2016) by focussing on local instead of remote consequences has been recommended as a promising communication strategy to bring the issue closer to people (e.g., Shome & Marx, 2009; van der Linden, Maibach, & Leiserowitz, 2015).

These recommendations often refer to the concept of *psychological distance* which is embedded in construal-level theory (CLT, Trope & Liberman, 2010). It is defined as subjective perception that a phenomenon is far away from the self on four dimensions: spatial (e.g., where an event occurs), social (to whom), temporal (when), and hypothetical (whether it happens). In the language of CLT, the strategy of proximising hence aims at reducing the *psychological socio-spatial distance of climate change*. CLT does not clearly specify whether main effects of changing psychological distance on cognitions and behaviours are expected. However, advocates of proximising appear to assume that communicating socio-spatial proximity may 1) reduce the

psychological socio-spatial distance, which in turn 2) makes the issue more relevant for people, and consequently 3) promotes behavioural engagement (e.g., Scannell & Gifford, 2013; cf. Brügger, Dessai, Devine-Wright, Morton, & Pidgeon, 2015).

Research so far has only incompletely tested this assumed process. First, few experimental studies, communicating socio-spatial proximity vs. distance, have included a measure of psychological socio-spatial distance and evidence within those that have is mixed. Jones, Hine, and Marks (2017) found that psychological social and spatial distance of climate change decreased in an experiment which varied communicated proximity vs. distance of climate change using all four CLT dimensions of psychological distance at once. However, Brügger et al. (2016) only found a tendency towards reduced psychological distance (measure including all four dimensions) when communicating socio-spatial proximity (vs. distance) of climate change, possibly because they did not differentially consider the dimensions.

Second, the relevance attributed to the issue of climate change has also rarely been investigated. Whilst Schoenefeld and McCauley (2016) found no effect of communicating socio-spatial proximity (vs. distance) of climate change on relevance attributions, Spence and Pidgeon (2010) found an increased relevance attributed to received local information on climate change (compared to distant).

Third, correlational studies rather consistently suggest a negative relation between psychological distance and climate protective behavioural intentions (Carmi & Kimhi, 2015; Sacchi, Riva, & Aceto, 2016; Spence et al., 2012). However, seemingly contradicting this, perceiving stronger impacts for developing countries (socio-spatial distance) has been found to be a positive predictor of climate protective behavioural intentions, indicating that perceptions of climate injustice might also motivate engagement (Spence et al., 2012). Examining the relation between issue relevance and climate protective behaviour, Visser, Krosnick, and Simmons (2003)

found that the more important people considered climate change, the more likely they had donated for climate protection and written to a public official or publicly discussed the issue.

Experimental research has investigated the impact of proximising climate change on engagement in climate protection, though this literature is again sparse and evidences mixed results (McDonald, Chai, & Newell, 2015). For example, communicating socio-spatial proximity (vs. distance) did not influence support for climate protective policy measures or behavioural intentions to mitigate climate change in experiments by Brügger et al. (2016), Schoenefeld and McCauley (2016), Shwom, Dan, and Dietz (2008), and Wiest, Raymond, and Clawson (2015). However, Jones et al. (2017) found that communicating proximity (vs. distance) on all four CLT dimensions at once increased mitigation intentions and predicted them indirectly through lower psychological social and hypothetical distance and higher climate change concern. Moreover, communicating socio-spatial proximity increased self-reported climate change engagement compared to a no-message condition (Scannell & Gifford, 2013).

### 2.2 Bridging the Psychological Socio-spatial Distance of Climate Change

Proximising climate change can be criticised as reducing a global phenomenon to a local issue, which might banalise the associated challenges. We reasoned that a reduction in the psychological socio-spatial distance of climate change may not necessarily make the issue more relevant. If individuals identify with people in distant locations, they might consider the consequences for close and remote locations and people equally important. In other words, they might be able to *bridge* the psychological socio-spatial distance (see also Brügger et al., 2015; Shwom et al., 2008). Methodically, this assumption means that the relationship between the psychological socio-spatial distance of climate change and the relevance attributed to the issue might be moderated by the connectedness individuals feel with affected people.

The idea of a *global identification* with people all over the world has been investigated

under different labels (see McFarland et al., 2019). Correlational studies found that an inclusive global identity measured as a trait was positively related to the relevance attributed to climate change (Katzarska-Miller, Reysen, Kamble, & Vithoji, 2012; Running, 2013), proenvironmental attitudes and behaviours (Brieger, 2019; Der-Karabetian, Cao, & Alfaro, 2014; Lee, Ashton, Choi, & Zachariassen, 2015; Renger & Reese, 2017; Reysen & Hackett, 2016; Reysen & Katzarska-Miller, 2013), support of environmental movements (Leung, Koh, & Tam, 2015; Rosenmann, Reese, & Cameron, 2016), and collective action intentions for climate change victims (Barth, Jugert, Wutzler, & Fritsche, 2015). Furthermore, self-categorisation theory (SCT; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987) proposes that situational cues can trigger whether people's personal identity, social group identity, or global identity as a human is more salient, thus guiding perceptions and actions. In line with this, previous research has found that pictures in the room displaying connectedness between people of different nationalities, which can be interpreted as situational cues triggering global identification, resulted in larger donations to global charities (Reese, Proch, & Finn, 2015).

### 2.3 Current Research

In the current research, we aimed to experimentally examine the impact of proximising climate change and of making global identity situationally salient on how individuals respond to communications about climate change. We hypothesised that the communication of socio-spatial proximity (vs. distance) of climate change in a news text would reduce recipients' psychological socio-spatial distance of climate change (H1) and would positively predict the relevance attributed to the news text about climate change indirectly through lower psychological socio-spatial distance (H2). Through lower psychological socio-spatial distance of climate change and greater attributed issue relevance, proximal communication would also positively predict climate protective behaviour (H3). Furthermore, we predicted that making global identity salient would

increase the relevance attributed to a news text about climate change (H4) and climate protective behaviour (H5). Moreover, it would moderate (weaken) the relation between the psychological socio-spatial distance of climate change and the relevance attributed to the news text about climate change (H6). Figure 1 summarises our research hypotheses.

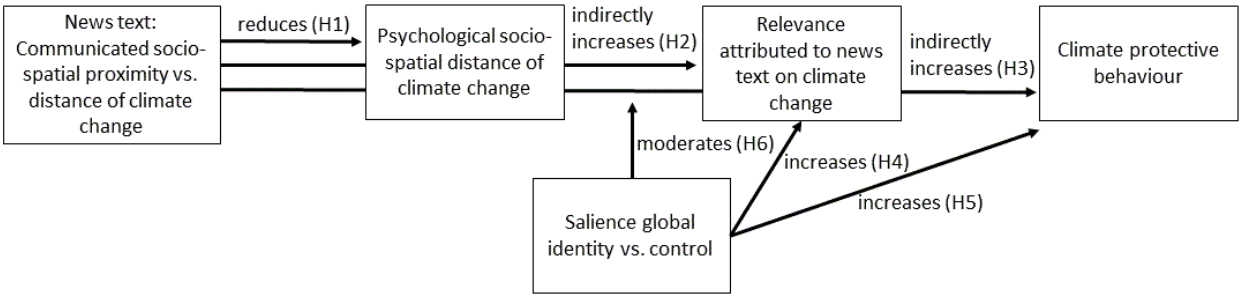


*Figure 1*. Research hypotheses.

## 3. Method

### 3.1 Participants, Design, and Procedure

We used a quota sample of the UK consisting of $N$ = 508 UK residents ($n$ = 264 females, $M$ = 47.5 years of age, $SD$ = 16.3; Supplement 1.1). Participants completed the study online and, after completing informed consent, were randomly assigned to one of four experimental conditions or a fifth control condition in a 2 (video: salience of global identity vs. control) × 2 (news text: communicated proximity vs. distance) + 1 (control: no stimuli) between-subjects design (see randomisation check in Supplement 2.1).

In the present paper, we analyse the four experimental conditions ($n$ = 400; for further results, see Loy, 2018). Participants first saw one of two videos. To raise the salience of global identity, we used a video of a man dancing with people all over the world that has been found to communicate a feeling of connectedness (Kirsner, 2011; Kitzmann, 2015) and to raise universal orientation (Krämer et al. (2017). A control video displayed an underwater world with fish (for details and manipulation checks, see Supplement 1.3.1). Next, participants read a news text

which outlined scientific knowledge on climate change and suggested solutions (Committee on Climate Change, 2016; IPCC, 2014; Met Office, 2011a, 2011b). We either described consequences as affecting the UK (proximity) or Bangladesh (distance; for details and manipulation checks, see Supplement 1.3.2).

After this, participants answered measures of psychological distance, perceived relevance of the text provided, and behavioural engagement with, and intentions in relation to, climate change (for further variables, see Supplement 1.2). The questionnaire ended with a debriefing. The university's ethics committee approved the study.

### 3.2 Dependent Measures

The dependent measures and descriptive statistics are provided in the Appendix. We adapted measures of the four-dimensional psychological distance of climate change from Spence et al. (2012) and Jones et al. (2017). Our analyses focussed on the confounded dimensions of *psychological socio-spatial distance* addressed by the communication strategy of proximising. We measured the *relevance attributed to the news text on climate change* with semantic differential scales (e.g. irrelevant – relevant), adapted from Weber and Wirth (2013) and Spence and Pidgeon (2010).

We used two within-study opportunities to theoretically engage in climate protective behaviour. First, we assessed people's investment in information (cf. Pahl & Bauer, 2013). We introduced four climate initiatives and asked whether participants were interested in further information about each. The answers were aggregated to a score for the *amount of information* viewed from 0 (*none*) to 4 (*all initiatives*, Supplement 1.4). We further summed the *information time* participants spent on the pages. Second, we developed a budget allocation task (cf. Spence, Leygue, Bedwell, & O'Malley, 2014) in which participants imagined they were part of a local community council that distributes £100,000 of funding to five out of 20 local initiatives. Five

were climate-related. We determined the *number of climate-related initiatives supported* and the amount of *budget allocated to these initiatives*. Additionally, we asked participants for their climate protective behavioural intentions drawing on the General Ecological Behaviour scale (e.g., Kaiser & Wilson, 2000, 2004).

## 4. Results and Discussion

We conducted all analyses using the statistical environment *R* (Supplement 1.5). Randomisation and manipulation checks were successful (Supplement 2.1 and 2.2). Confirmatory factor analyses (CFA) and Rasch analysis showed decent fit statistics of our scales. However, we had to exclude some participants due to missing or implausible values, leaving a sample of $n$ = 383 (Supplement 2.3). Bivariate correlations are provided in Supplement 2.4; descriptives differentiated for conditions in Supplement 2.5.

We calculated a path model to examine how communicated socio-spatial proximity (vs. distance) of climate change in the news text related to participants' psychological socio-spatial distance of climate change, the relevance attributed to the news text, and climate protective behavioural engagement, repeating this both with and without the moderation of the relationship between psychological socio-spatial distance and relevance attribution by our global identity salience (vs. control) condition (Supplement 2.6).

### 4.1 Communicating proximity vs. distance of climate change

The unmoderated model fitted the data well, $\chi^2(1) = 1.42$, $p = .234$; CFI = 1.00; TLI = .98; RMSEA = .033, 90% CI [.000, .145]; SRMR = .010 (see Figure 2; for statistical details, Supplement 2.6.1). The communication of socio-spatial proximity (vs. distance) of climate change in the news text reduced recipients' psychological socio-spatial distance of climate change (H1; $B$ = -0.77, $SE$ = 0.13, 95%CI [-1.02; -0.52], ß = -.30). UK residents who read about consequences in the UK were less likely to believe climate change would mostly affect other

people in distant locations compared to participants who read about consequences in Bangladesh.

Proximising positively predicted the relevance attributed to the news text about the climate change issue indirectly through lower psychological socio-spatial distance (H2; *B* = 0.15, *SE* = 0.05, 95%CI [0.06; 0.24], ß = .06). However, we found no significant total relation between the communication of proximity and relevance attribution (i.e., including the direct and indirect path, which is comparable to a main effect).

Proximising positively predicted the indicators of climate protective behavioural engagement indirectly through lower psychological socio-spatial distance and higher relevance attribution (H3, serial indirect relation): amount of information viewed on climate protective engagement options (*B* = 0.05, *SE* = 0.02, 95%CI [0.02; 0.09], ß = .02), time spent viewing this information (*B* = 1.86, *SE* = 0.63, 95%CI [0.62; 3.09], ß = .02), number of climate-related initiatives supported in the budget allocation task (*B* = 0.04, *SE* = 0.01, 95%CI [0.02; 0.07], ß = .02), amount of budget allocated to these (*B* = 0.97, *SE* = 0.34, 95%CI [0.31; 1.64], ß = .02), and climate protective behavioural intentions (*B* = 0.03, *SE* = 0.01, 95%CI [0.01; 0.06], ß = .02). However, we found no significant total relations for all indicators (i.e., including the direct path as well as the three indirect paths through 1) psychological socio-spatial distance, 2) relevance attribution, and 3) both sequentially).

The finding of only indirect but not total relations between proximising climate change and relevance attribution or the behavioural outcomes seems striking at first sight. However, O'Rourke and MacKinnon (2015) showed that mediator models can be more powerful than the test of the total relation in large samples with small coefficients, because the standard error of the total relation can be larger than of the indirect relation. Our results thus shed light on an indirect process underlying possible effects of proximising. We suggest that proximising climate change by foregrounding local consequences in news portrayals may be a useful communicative means

to *reduce* the psychological socio-spatial distance of climate change and thereby indirectly motivate public engagement. However, this process should be replicated by follow-up studies before drawing strong conclusions and recent cautious notes regarding local messaging of sea level rise risks should be considered (Mildenberger, Lubell, & Hummel, 2019).

Even though these indirect observed relationships were small, stronger relations might be found if people repeatedly receive local information. Further research would usefully expand on our findings by examining the impacts of repeated exposure (e.g., Lecheler, Keer, Schuck, & Hänggli, 2015). The cross-sectional design compromises causal conclusions. Only the first step of the assumed process behind proximising (i.e., the communication of proximity vs. distance) was experimentally varied. Thus, a causal impact in the serial model can be inferred only for the effect of proximising on psychological socio-spatial distance. Follow-up research should thus use longitudinal and causal-chain approaches.

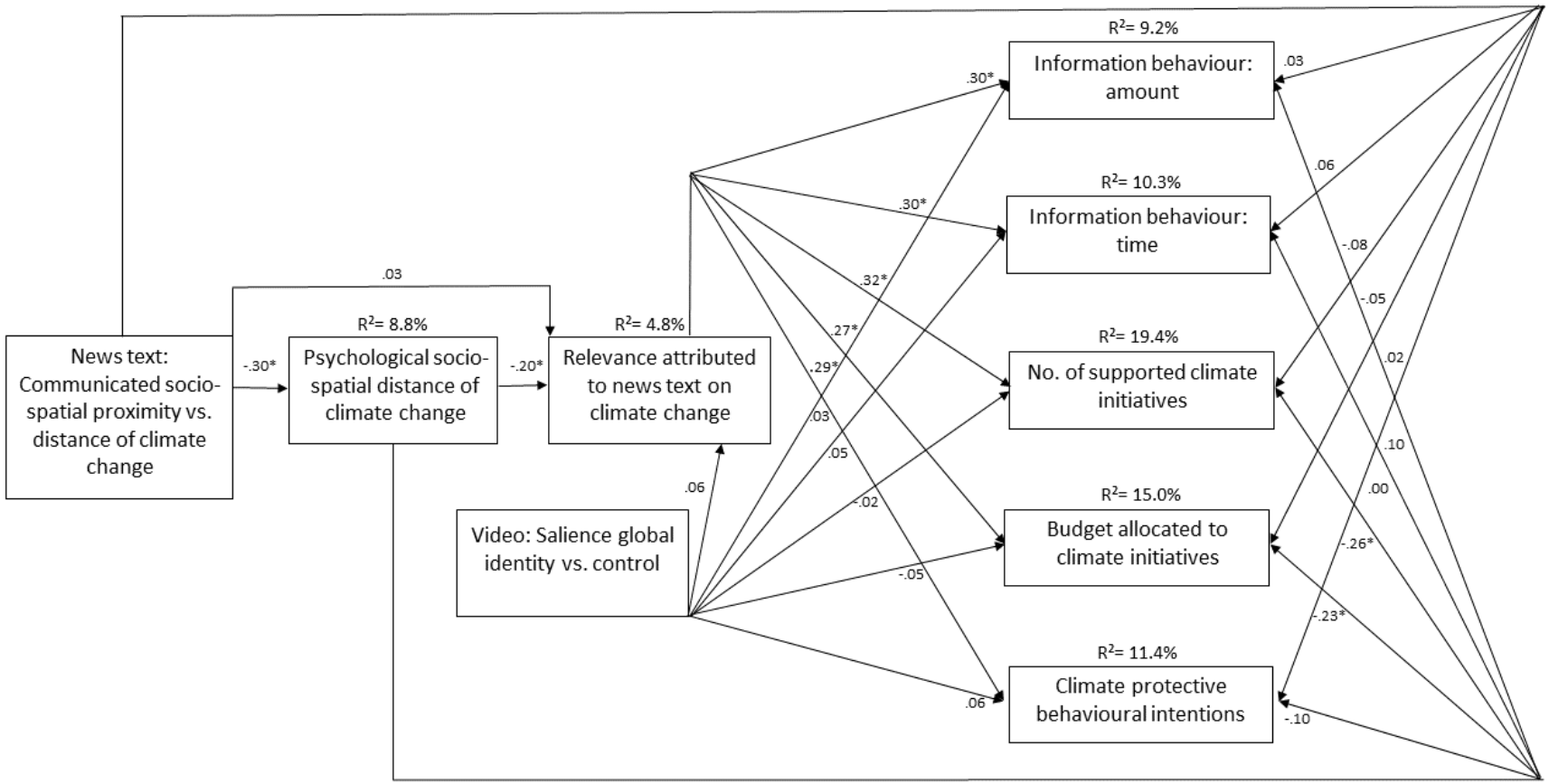


*Figure 2.* Unmoderated path model testing H1 to H5.
*Note*. Standardised coefficients are displayed. * $p < .05$. Residual covariances between the behavioural outcomes are not displayed to reduce complexity.

### 4.2 Raising the salience of global identity

Making global identity salient (i.e., through a video communicating the connectedness of people all over the world) before receiving a news text about the climate change issue did not increase the relevance attributed to the news text (disconfirming H4) and climate protective behavioural engagement (disconfirming H5; all total relations as well as direct and indirect paths were non-significant; see Figure 2).

The second version of the model including the interaction between psychological socio-spatial distance and video condition (figure in Supplement 2.4) fitted the data well, $\chi^2(8) = 13.76$, $p = .088$; CFI = .99; TLI = .96; RMSEA = .042, 90% CI [.000, .080]; SRMR = .031. The interaction predicted relevance attribution (H6: $B = 0.20$, $SE = 0.10$, 95% CI [0.004; 0.41], $p = .046$, $\beta = .14$). Decomposing the interaction showed that people who had received the control video (underwater world with fish) found the provided news text on climate change to be less relevant the more distant they perceived the climate change phenomenon ($B = -.29$, $SE = 0.06$, 95% CI [-0.42; -0.17], $p < .001$, $\beta = -.29$). However, there was no such relation among people who had received the video raising global identity salience ($p = .293$, $\beta = -.09$; see Figure 3).

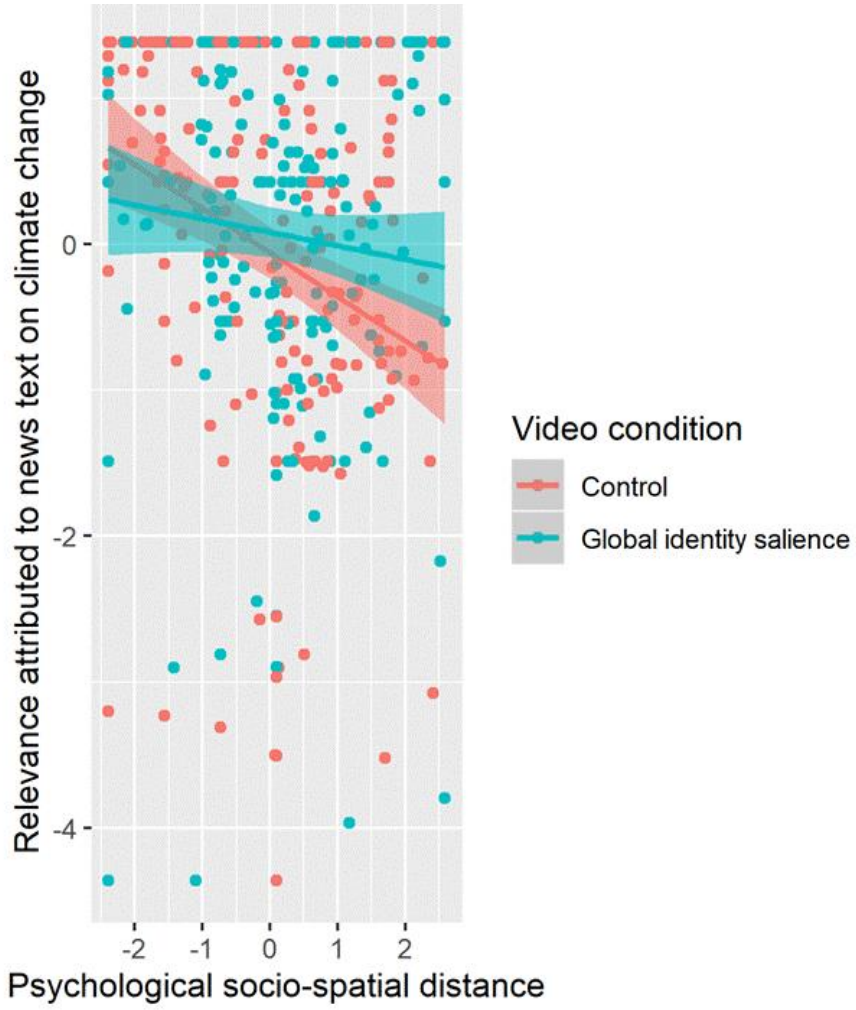


*Figure 3.* Decomposed interaction testing H6.
*Note*. Factor scores were used.

These findings suggest that communicating a feeling of connectedness with people all over the world might be a useful communicative approach when distant impacts are reported, as it seems to be a way to *bridge* the psychological socio-spatial distance of climate change communication and render issues that are perceived as mainly affecting other people in far-off locations more relevant to recipients. It has to be kept in mind though that global identity salience did not affect overall issue relevance and climate protective behaviour in our study. Also the interaction effect needs thorough replication in follow-up studies before drawing firm conclusions.

The social identity perspective on proenvironmental behaviour (Ferguson, McDonald, & Branscombe, 2016; Fritsche, Barth, Jugert, Masson, & Reese, 2018) indicates that if social identity rather than personal identity is salient in a given context, people are more likely to change their behaviour in favour of the collective interests of the respective group. We deem it worthwhile to further investigate how a global identity (i.e., being part of the inclusive ingroup of all humanity) can be made salient to people. Alternative ways of raising global identity salience that could be more easily embedded in climate change communication than a video should be developed, such as visual material (cf. Reese et al., 2015) or global identity-related wording (cf. Seyranian, Sinatra, & Polikoff, 2015; Tu, Khare, & Zhang, 2012).

## 5. Conclusion

Our findings indicate that proximising climate change can reduce the psychological socio-spatial distance of climate change and has the potential to indirectly motivate climate protective engagement through this reduced distance and a higher relevance attributed to the issue of climate change. However, when people consider themselves as part of a global society, proximising may not be necessary as people perceive the relevance of distant impacts. From a practical perspective, both proximising climate change and communicating global connectedness might be useful means of climate change communication.

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# 7. Appendix

## A. Measure of psychological socio-spatial distance of climate change

To what extent do you disagree or agree with the following statements?

Answer format: 1 = strongly disagree, 2 = mostly disagree, 3 = tend to disagree, 4 = neither disagree nor agree, 5 = tend to agree, 6 = mostly agree, 7 = strongly agree

Psychological social distance

1. Serious consequences of climate change primarily impact other people.
2. Climate change mostly affects people I do not know.
3. Climate change is a significant problem mainly for others.

Psychological spatial distance

1. Serious consequences of climate change primarily occur in places that are far away from here.
2. Climate change mostly affects other parts of the world.
3. Climate change is a significant problem mainly in distant locations.
4. Impacts of climate change are primarily experienced in developing countries.
   *(Additional item covering the content of the experimental manipulation)*

Psychological temporal distance

1. Serious consequences of climate change will be felt primarily in the future.
2. Climate change effects will mostly occur in the future.
3. Climate change will be more of a significant problem in the future compared with now.

Psychological hypothetical distance

1. I am uncertain whether the climate is changing.
2. I am uncertain over the causes of climate change.
3. I am uncertain what the effects of climate change are.

## B. Measure of relevance attributed to the news article about climate change

Please think about the article you just read. The article is…

Answer format: 1 2 3 4 5 6 7

1. uninteresting – interesting
2. unimportant – important
3. irrelevant – relevant
4. meaningless – meaningful
5. useless – useful

## C. Budget allocation task

Imagine that you are in a local council that decides how your community distributes **funding to local initiatives**. You must decide to give £100,000 to 5 local initiatives which you believe to be the most important. Below you find a list of the initiatives that have applied for funding. Please select 5 different initiatives you would like to support and allocate the amount of funding you would like to provide for each of them.

Note: you can allocate in amounts of £1,000 and the amounts should add up to £100,000.

Climate change relevant initiatives

1. Extension of local **cycling routes** to promote the use of bikes
2. Financial support for **renewable energy sources** on houses to reduce $CO_2$ emissions
3. Support to a **local organic gardening and farming** initiative to reduce environmental impact
4. Establishing a local **climate change council** to advise on policy measures
5. **Flood defence measures** to reduce infrastructure damage

Not climate change relevant initiatives

1. New **playground** to increase activity opportunities for children
2. Support to **scout and guide groups** to increase activity opportunities for children
3. Support to **meeting centre for the elderly** to reduce social isolation
4. Installing **CCTV cameras** in public places to increase safety
5. New **sport facilities** to promote activity and health
6. Support to a **local artist** initiative to increase cultural awareness and space
7. Low-cost **language courses** to increase job opportunities and education
8. Low-cost **computer courses** to increase job opportunities and education
9. New **shopping centre** to attract businesses
10. New **car parks** to reduce search times and walking distances
11. Support to a **music school** to foster creativity
12. Offering **career counselling** to provide orientation for young professionals
13. New **festival** to increase local cultural opportunities
14. Support to an initiative **welcoming refugees** to promote integration
15. Support to a **youth centre** to provide a meeting place for young people

## D. Measure of climate protective behavioural intentions

In the following, you find a list of actions. Please indicate **how often you intend to perform these actions**. Please choose "cannot answer" if an action is not applicable to your current living situation (e.g., you cannot comment on your driving behaviour if you do not have a driver's licence)

Answer format: 0 = never, 1 = seldom, 2 = once in a while, 3 = occasionally, 4 = often, 5 = very often, 6 = always || cannot answer

Items in italics are behaviours that were addressed in the stimulus text.
(-) reverse-coded items

Transport

1. *Walk, ride a bicycle or take public transport for short journeys (less than 5 km)*
2. *Use a car for travel in nearby areas (up to 30 km) (-)*
3. Drive economically (e.g. braking/ accelerating gently)
4. Car share with somebody else
5. *Fly within the UK (-)*
6. *Use an aeroplane for longer journeys (more than 600 km) (-)*

Energy use

7. Use a clothes dryer (-)
8. Put on layers of clothes rather than use electric/gas heating
9. Have showers that last over ten minutes (-)
10. Fill the kettle fully every time I use it over the amount I actually need (-)
11. *Leave appliances on standby instead of switching them off (e.g., computer, TV) (-)*

12. *Disconnect phones or other devices when finished charging*

Resource use

13. *Buy seasonal food (e.g., fruit and vegetables)*
14. *Eat vegetarian options rather than having meat*
15. Buy alternative products because they have less packaging than others on offer
16. Share appliances with others instead of buying new ones (e.g., electric appliances)
17. Re-use or repair items instead of throwing them away
18. Recycle waste as much as possible

Social actions

19. *Discuss with someone why their behaviour might be climate damaging*
20. Speak to someone in authority (e.g. MP/ employer/ hall warden/ student union) about climate change issues
21. Contribute financially to a climate change campaign or organisation
22. Take the time to learn more about climate friendly practices (e.g., in books, magazines, Internet)
23. Boycott products of companies that demonstrably behave in a manner that damages the climate
24. *Take part in a campaign or protest about climate change related issues*

## E. Descriptives of the dependent measures

Table 1. *Psychometric properties of the dependent measures*

| Variable | *n* | *M* | *SD* | Range | Items | α | ω | AVE | $R_P$ |
|---|---|---|---|---|---|---|---|---|---|
| Psychological socio-spatial distance of climate change | 508 | 3.93 | 1.50 | 1.00–7.00 | 7 | .94 | .95 | .74 | |
| Relevance attributed to news text on climate change [a] | 400 | 5.55 | 1.31 | 1.00–7.00 | 5 | .94 | .94 | .76 | - |
| Climate protective behaviour | | | | | | | | | |
| Information amount | 508 | 1.64 | 1.48 | 0.00-4.00 | - | - | - | - | - |
| Information time (in sec) | 505 | 36 | 54 | 0–394 | - | - | - | - | - |
| Number of supported climate initiatives | 508 | 1.88 | 1.24 | 0.00–5.00 | - | - | - | - | - |
| Budget allocated to climate initiatives (in £) | 497 | 40,613 | 30,019 | 0-100,000 | - | - | - | - | - |
| Climate protective behavioural intentions [b] | 498 | -0.19 | 1.00 | -4.16–3.80 | 24 | .67 | - | - | .72 |

*Note*. [a] Only assessed in experimental conditions receiving the news text. [b] Results are based on Rasch analysis. α = Cronbach's alpha, ω = Raykov's omega, AVE = average variance extracted, $R_P$ = Rasch-based person separation reliability.

**Reducing, and bridging, the psychological distance of climate change**

Laura S. Loy & Alexa Spence

Supplemental Material

## 1. Method

### 1.1 Participants

To our knowledge, there are no established state-of-the-art recommendations for power analyses of path modelling and SEM (Kline, 2016). Using G*Power 3 (Faul, Erdfelder, Lang, & Buchner, 2007), we determined the sample size necessary to detect small effects ($f^2 = .02$) at $p < .05$ with 90% power in a multivariate analysis of variance for a design with five conditions and eleven dependent variables (not all examined here). We expanded the aspired sample size from the resulting 450 to around 500 people to allow for a reduction due to technical problems or missing data.

In the review process of this paper, it was highlighted that we had not considered the interaction effect between the experimental conditions in our power analysis. We re-calculated the analysis considering interaction effects and leaving the other parameters equivalent. It resulted in a sample size of 685 we should have aimed for. Reducing the aspired power to 80% resulted in a sample size of 553 which is still more than our recruited sample of $N = 508$ ($N = 546$ including speeding people). Hence, we acknowledge that the power is slightly lower than it should be for the analysis of the interaction and that this is a shortcoming of our study.

Additionally, recent simulation research by Goldberg (2019) examined what sample size is necessary to satisfactorily eliminate chance differences in baseline variables despite random assignment (such as demographics, pre-study levels of the dependent measures, or potential confounds). He showed that in experiments with around 100 people per condition (as in the case of our study), a chance difference in baseline variables despite random assignment of $d = .2$ occurred in 18% of samples, of $d = .3$ in 4% of samples, and of $d = .4$ in 1% of samples. Chance differences of $d = .3$ or .4 were < 1% only for sample sizes of 150 people per condition and above. Chance differences of $d = .2$ still occurred in 8% of samples with 150 people per

condition, in 6% of samples with 200 people per condition, and in 4% of samples with 250 people per condition. Hence, also these results indicate that a larger sample would have been better.

The panel provider Lightspeed GMI recruited participants. With the aim of a varied sample, we used a quota sampling technique for age group and gender based on the 2011 UK census (see Table 2). We excluded $n = 38$ people who answered the questionnaire in less than 40% of the median response time during the recruitment procedure from our analyses (Leiner, 2013).

Table 2. *Demographic characteristics of the sample*

| | Proportion in sample (%) | Proportion in UK population [a] (%) |
|---|---|---|
| Gender | | |
| Female | 52.0 | 51.5 |
| Male | 48.0 | 48.5 |
| Age group females | | |
| 18 to 29 years | 10.2 | 10.0 |
| 30 to 39 years | 7.9 | 8.0 |
| 40 to 49 years | 9.3 | 9.5 |
| 50 to 59 years | 8.1 | 8.0 |
| 60 to 99 years | 16.5 | 16.0 |
| Age group males | | |
| 18 to 29 years | 9.4 | 10.0 |
| 30 to 39 years | 8.1 | 8.0 |
| 40 to 49 years | 9.4 | 9.5 |
| 50 to 59 years | 8.3 | 8.0 |
| 60 to 99 years | 12.8 | 13.0 |
| Working status | | |
| full-time (30+ hours per week) | 42.9 | |
| part-time (9-29 hours per week) | 11.2 | |
| Unemployed | 6.1 | |
| Retired | 23.0 | |
| looking after the house/children | 6.9 | |
| Disabled | 5.3 | |
| Students | 3.1 | |
| Other | 0.1 | |
| Highest qualification | | |
| no formal qualifications | 5.9 | |
| still studying | 0.1 | |
| GCSE/O-level/CSE | 22.0 | |
| vocational qualifications (NVQ1+2) | 8.7 | |
| A-level or equivalent (NVQ3) | 20.5 | |
| bachelor or equivalent (NVQ4) | 29.9 | |
| master or equivalent | 8.5 | |
| PhD or equivalent | 2.2 | |
| Other | 1.8 | |

*Note*. [a] Based on the 2011 UK census

### 1.2 Design and Procedure

We used SoSci Survey (www.soscisurvey.de, Leiner, 2019) for programming an online questionnaire. Further variables that were not covered in this manuscript comprised knowledge covered in the news text, global connectedness, construal level, climate change-related media experience (see Loy, 2018), and situational global identity (see Supplement 2.8). Participants in the no-stimulus control group received the same questions excluding those that directly referred to the stimulus material such as the relevance attributed to the news text and the respective manipulation checks.

### 1.3 Stimulus Material

#### 1.3.1 Video to raise the salience of global identity

We used a shortened version (1 min 30 s) of "Where the hell is Matt 2008" as a video aimed at raising the salience of global identity, selecting the scenes in which the protagonist is dancing with other people around the world (https://www.youtube.com/watch?v=zlfKdbWwruY). We received permission of Matt Harding to use his video. The control video consisted of a quiet aquarium scene with fish that was available under creative commons licence. Length and music were kept constant between videos.

As a manipulation check, we asked participants whether the video reminded them about times when they felt close and connected to others as well as four distractor items (Kitzmann, 2015, see Appendix). We additionally measured environmental concern to see if this was unintentionally raised by the fish (control) video (see Appendix).

#### 1.3.2 News text varying in communicated socio-spatial distance of climate change

In the following, we present the two news texts used in the study. The specific contents and wording were inspired by real news articles and kept constant apart from specific references to the country name and a picture showing flooding in the UK versus Bangladesh.

As manipulation checks, we assessed the *perceived communicated distance* of climate change in the news text by asking how the journalist portrays the topic climate change in the article with two questions for temporal ($r_S$ between items = .52), spatial ($r_S$ = .66), social ($r_S$ = .48), and hypothetical distance ($r_S$ = .69; see Appendix). As control questions, we asked participants whether the article is reliable and comprehensible, and whether the journalist portrays climate change as severe (two items, $r_S$ = .76) and relevant. Moreover, as people might experience lower instrumentality when the text is about a distant location and distant people (see Spence et al., 2011), we included two questions examining instrumentality ($r_S$ = .79; see Appendix).

*News text communicating proximity of climate change.*[1]

29 March 2016, 16:18 pm

## The future for the UK with climate change

Flooding of Ramsgate: High water events are increasing in the UK due to climate change

**Increasing extreme weather events, emerging diseases and resource losses are just some of the impacts of climate change that are expected to affect the UK. The report of the United Nations Intergovernmental Panel on Climate Change sums up current research results and probable scenarios of our future.**

By S. Cohen

**How much has the temperature risen and why?**

Between 1880 and 2012, the temperature average on earth rose by 0.8°C. The ten warmest years since the beginning of systematic measurement all occurred after 1997. Scientists argue that this accumulation of hot years is beyond coincidence and cannot be explained without climate change.

The experts of the Intergovernmental Panel on Climate Change (IPCC) assume that humans significantly influence this trend. The greenhouse gas carbon dioxide ($CO_2$) is increased in the earth's atmosphere by burning fossil fuels such as coal, oil and gas as well as by cutting down forests which absorb carbon. Agriculture and livestock farming produce methane and nitrous oxide, which are also greenhouse gases. The increase of these greenhouse gases leads to a warming of the planet's lower atmosphere and surface.

**How hot could it get?**

The IPCC have developed different scenarios that could describe the future of the earth's climate. In the most optimistic case, average temperature will only rise by a further 0.5°C by 2100. Compared to the pre-industrial era this would be a total increase of 1.5°C. However, this scenario assumes that $CO_2$ emissions will only slightly increase in the next decade and will massively drop from 2030 onwards. After 2070, humanity would have to stop emitting greenhouse gases entirely.

At the other extreme lies a darker vision of the future: Power generating plants, factories and cars will emit more and more climate-damaging gases in the upcoming years. Climate protective measures will only slowly be effective after 2050. This would mean that in 2100, the 4°C threshold will be crossed and in 2150, the earth would be 7°C warmer.

At the moment, greenhouse gas emissions are increasing every year by approximately two percent. In 2013, 36 million tons of $CO_2$ were released into the atmosphere, around sixty percent more than in 1990. It is the political goal to keep global warming "well below 2°C".

**What is the relation between climate change and sea level rise?**

According to the IPCC, sea level rose by 19 centimetres in the 20th century. This rise appears to be faster than in the preceding two centuries. Depending on the scenario, a rise between 25 centimetres and one meter is imaginable. The reason for this is that the ice sheets of the polar regions and Greenland are melting at an increasing rate and mountain glaciers worldwide are disappearing. Permafrost soils, which store large quantities of the greenhouse gas methane, are also increasingly thawing. Additionally, since the beginning of industrialisation, oceans have become warmer and more acidic due to their uptake of CO2.

**What are the consequences of climate change for people in the UK?**

IPCC scenarios also describe likely consequences of climate change for people in the UK. Extreme heat waves will become more frequent. The probability of drought periods in some areas will also rise. In periods of strong heat and drought, there is an increased danger of forest fires.

Moreover, heavy rainfalls will increase in many regions and strong storms are expected more frequently. Trend estimations predict more numerous and stronger flooding events and associated damage to infrastructure. This increase in flood risk is due to intense downpours driving river flooding as well as sea-level rise. At the same time, however, the UK could also face threats to its water security and supply. Climate change is projected to reduce the amount of water in the environment that can be sustainably withdrawn. Declining river flows in dry periods, reduced groundwater replenishment and increased evaporation could all contribute to water shortages.

Moreover, researchers highlight the climate vulnerability of the UK in the health sector. For example, heat waves are expected to lead to more cardiovascular diseases and deaths. This could heighten pressure on healthcare services. Furthermore, insect populations including mosquitos are likely to spread with warm and wet conditions and will increase the transmission of infectious diseases such as malaria or chikungunya fever. The risk of reduced air quality due to pollution is also predicted to rise.

**What is the relation between climate change and resources?**

Climate change can have negative impacts on vitally important resources. In the UK, for example, the changing oceans negatively impact the fish population. Soils react to erratic rainfall causing subsidence damage and some agricultural coastal land will likely be lost to the sea or invaded by salt water. Moreover, climate impacts could lead to an international instability or reduction in food supply. The UK could experience increased food price volatility, especially for rice, wheat and corn, which are imported from tropical regions to Britain. The authors of the IPCC estimate that about one-tenth of these agricultural fields will provide 25% less yields between 2030 and 2049.

**Does climate change affect conflicts?**

The G7 foreign secretaries warn that climate change is "one of the central security threats of the 21st century". Reduced income opportunities, uninhabitable spaces and questions of resource access could lead to "cross-national tensions" and the "decay of states and societies". Even though climate change is not the sole trigger for such conflicts, the consequences of climate change may contribute to the destabilisation of peace between the UK and other countries.

**How can we react to climate change?**

Reducing greenhouse gas emissions through efficient use of energy and resources is key to limiting climate change. For example, people could use public transport more often and fly less. According to the UK department for transport statistics, flight travel in Britain produces about twice as much $CO_2$ as compared to travel by car and 5 times as much as compared to travel by train over the same distance.

Many activities involving electricity can be conducted more consciously. By switching things off rather than leaving things on standby, e.g. computers, TVs, coffee machines, British households can save around £80 on a bill of £500 according to a study conducted by the Energy Saving Trust. Phones and other devices can be disconnected when finished charging. Households could also switch to a 'green' energy provider. Green electricity uses renewable sources of energy instead of fossil fuel sources: energy from coal, for example, involves around 70 times as much $CO_2$ emissions as compared to wind energy and 30 times as much as hydroelectric power, according to the IPCC.

People could also think about climate change impacts when buying food. Buying seasonal vegetables and fruits reduces transport emissions and energy intensive cooling (e.g. tomatoes between June and October; strawberries between June and September; apples, beetroot or cabbage in the winter months). It is also an option to reduce meat consumption. The production of meat involves around 30 times the amount of greenhouse gas emissions as the same amount of vegetables. For beef the emissions are particularly high. Moreover, avoiding food waste saves resources and the energy involved in their production.

Finally, political or social engagement such as taking part in campaigns, supporting policy measures or simply talking to others about climate change can help to create a more sustainable society and encourage others to also take action. Many scientists fear that a limitation of global warming to 1.5°C is simply not possible, but others believe that if we transform today's lifestyles, we can limit the potential changes to our climate.

[1] Picture source (creative commons licence): http://www.geograph.org.uk/photo/3180406; text sources: http://www.sueddeutsche.de/wissen/erderwaermung-was-forscher-ueber-den-klimawandel-wirklich-wissen-1.2757138; https://www.bbc.com/news/science-environment-24021772; https://www.theguardian.com/environment/2013/oct/08/potential-impacts-climate-change-uk

*News text communicating distance of climate change.*[2]

29 March 2016, 16:18 pm

## The future for Bangladesh with climate change

Flooding of Brahmaputra plains: High water events are increasing in Bangladesh due to climate change

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The experts of the Intergovernmental Panel on Climate Change (IPCC) assume that humans significantly influence this trend. The greenhouse gas carbon dioxide ($CO_2$) is increased in the earth's atmosphere by burning fossil fuels such as coal, oil and gas as well as by cutting down forests which absorb carbon. Agriculture and livestock farming produce methane and nitrous oxide, which are also greenhouse gases. The increase of these greenhouse gases leads to a warming of the planet's lower atmosphere and surface.

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At the other extreme lies a darker vision of the future: Power generating plants, factories and cars will emit more and more climate-damaging gases in the upcoming years. Climate protective measures will only slowly be effective after 2050. This would mean that in 2100, the 4°C threshold will be crossed and in 2150, the earth would be 7°C warmer.

At the moment, greenhouse gas emissions are increasing every year by approximately two percent. In 2013, 36 million tons of $CO_2$ were released into the atmosphere, around sixty percent more than in 1990. It is the political goal to keep global warming "well below 2°C".

**What is the relation between climate change and sea level rise?**

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**What are the consequences of climate change for people in Bangladesh?**

IPCC scenarios also describe likely consequences of climate change for people in Bangladesh. Extreme heat waves will become more frequent. The probability of drought periods in some areas will also rise. In periods of strong heat and drought, there is an increased danger of forest fires.

Moreover, heavy rainfalls will increase in many regions and strong storms are expected more frequently. Trend estimations predict more numerous and stronger flooding events and associated damage to infrastructure. This increase in flood risk is due to intense downpours driving river flooding as well as sea-level rise. At the same time, however, Bangladesh could also face threats to its water security and supply. Climate change is projected to reduce the amount of water in the environment that can be sustainably withdrawn. Declining river flows in dry periods, reduced groundwater replenishment and increased evaporation could all contribute to water shortages.

Moreover, researchers highlight the climate vulnerability of Bangladesh in the health sector. For example, heat waves are expected to lead to more cardiovascular diseases and deaths. This could heighten pressure on healthcare services. Furthermore, insect populations including mosquitos are likely to spread with warm and wet conditions and will increase the transmission of infectious diseases such as malaria or chikungunya fever. The risk of reduced air quality due to pollution is also predicted to rise.

**What is the relation between climate change and resources?**

Climate change can have negative impacts on vitally important resources. In Bangladesh, for example, the changing oceans negatively impact the fish population. Soils react to erratic rainfall causing subsidence damage and some agricultural coastal land will likely be lost to the sea or invaded by salt water. Moreover, climate impacts could lead to an international instability or reduction in food supply. Bangladesh could experience increased food price volatility, especially for rice, wheat and corn, which are grown in tropical regions like Bangladesh. The authors of the IPCC estimate that about one-tenth of these agricultural fields will provide 25% less yields between 2030 and 2049.

**Does climate change affect conflicts?**

The G7 foreign secretaries warn that climate change is "one of the central security threats of the 21st century". Reduced income opportunities, uninhabitable spaces and questions of resource access could lead to "cross-national tensions" and the "decay of states and societies". Even though climate change is not the sole trigger for such conflicts, the consequences of climate change may contribute to the destabilisation of peace between Bangladesh and other countries.

**How can we react to climate change?**

Reducing greenhouse gas emissions through efficient use of energy and resources is key to limiting climate change. For example, people could use public transport more often and fly less. According to the UK department for transport statistics, flight travel in Britain produces about twice as much $CO_2$ as compared to travel by car and 5 times as much as compared to travel by train over the same distance.

Many activities involving electricity can be conducted more consciously. By switching things off rather than leaving things on standby, e.g. computers, TVs, coffee machines, British households can save around £80 on a bill of £500 according to a study conducted by the Energy Saving Trust. Phones and other devices can be disconnected when finished charging. Households could also switch to a 'green' energy provider. Green electricity uses renewable sources of energy instead of fossil fuel sources: energy from coal, for example, involves around 70 times as much $CO_2$ emissions as compared to wind energy and 30 times as much as hydroelectric power, according to the IPCC.

People could also think about climate change impacts when buying food. Buying seasonal vegetables and fruits reduces transport emissions and energy intensive cooling (e.g. tomatoes between June and October; strawberries between June and September; apples, beetroot or cabbage in the winter months). It is also an option to reduce meat consumption. The production of meat involves around 30 times the amount of greenhouse gas emissions as the same amount of vegetables. For beef the emissions are particularly high. Moreover, avoiding food waste saves resources and the energy involved in their production.

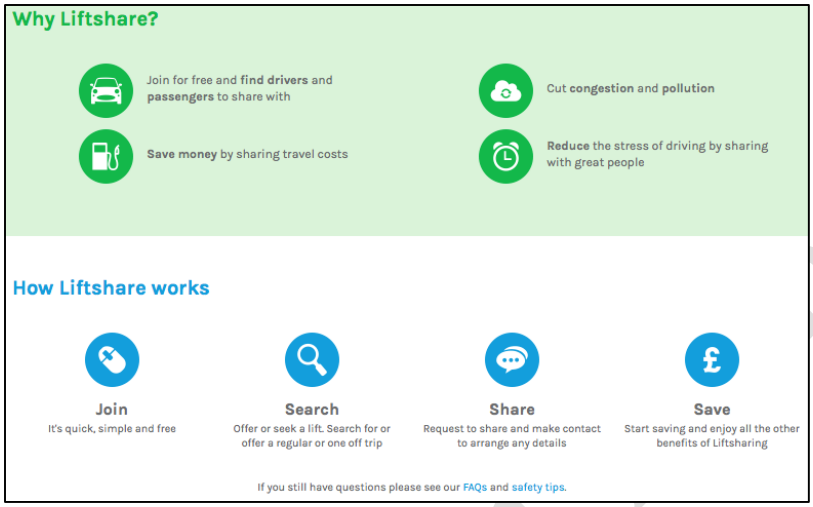
Finally, political or social engagement such as taking part in campaigns, supporting policy measures or simply talking to others about climate change can help to create a more sustainable society and encourage others to also take action. Many scientists fear that a limitation of global warming to 1.5°C is simply not possible, but others believe that if we transform today's lifestyles, we can limit the potential changes to our climate.

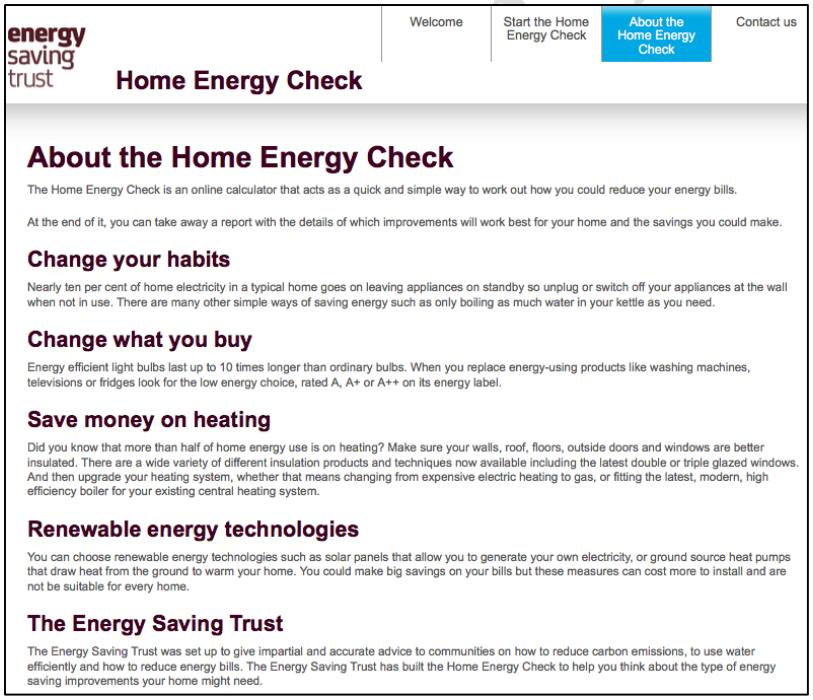
[2] Picture source (creative commons licence): https://commons.wikimedia.org/wiki/File:Brahmaputra_Plains_in_Goalpara_District_of_Assam_857.jpg; ; text sources: http://www.sueddeutsche.de/wissen/erderwaermung-was-forscher-ueber-den-klimawandel-wirklich-wissen-1.2757138; https://www.bbc.com/news/science-environment-24021772; https://www.theguardian.com/environment/2013/oct/08/potential-impacts-climate-change-uk

## 1.4 Dependent Measures

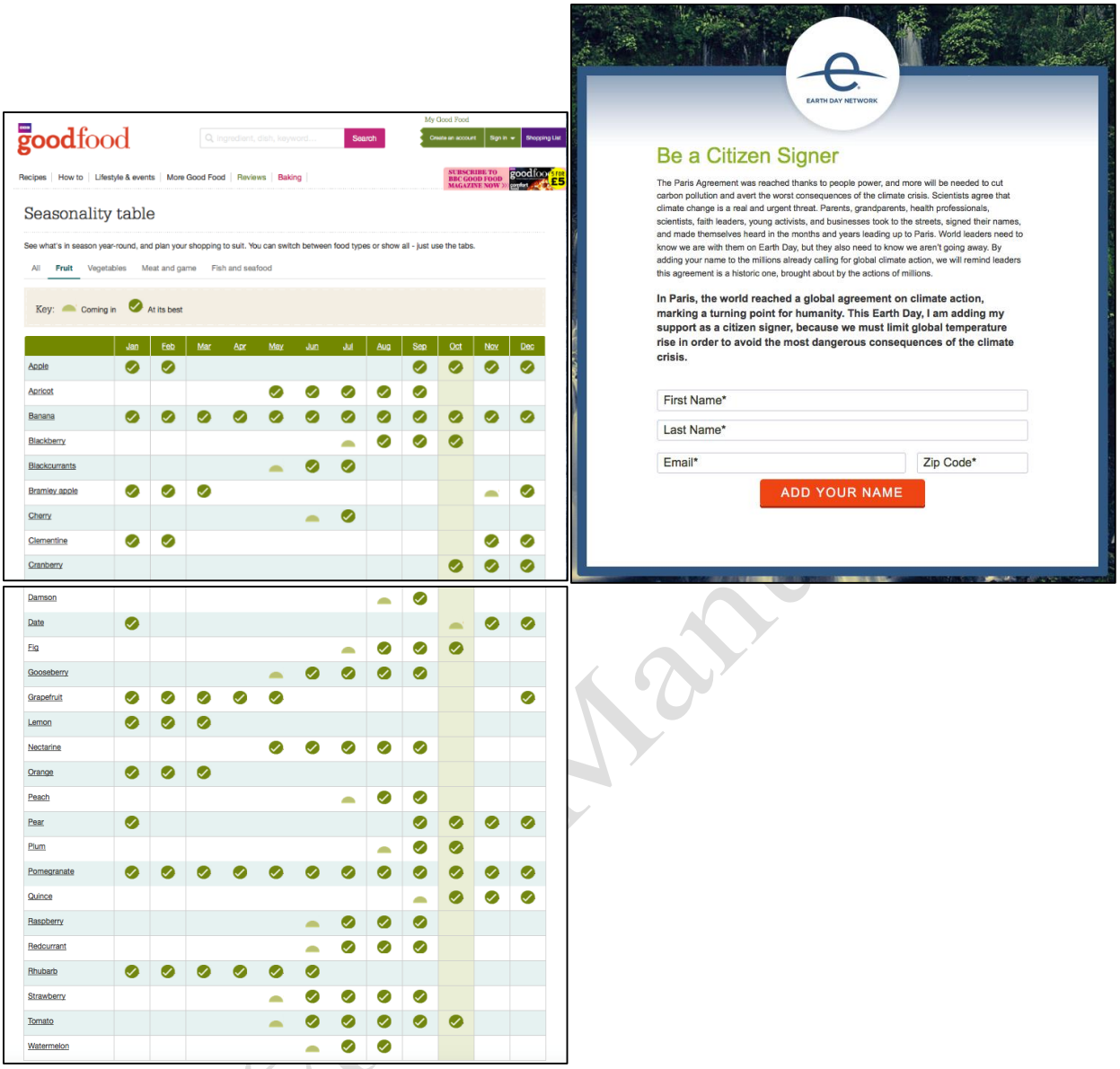
### 1.4.1 Climate protective behaviour

*Information behaviour*. The initiatives referred to transport (car sharing), energy use (energy calculator), resource use (seasonal food table), and social action (citizen movement). If participants requested further information, they received a corresponding screenshot:[3]




[3] https://liftshare.com/uk; http://hec.est.org.uk/About.aspx; https://www.bbcgoodfood.com/seasonal-calendar/all, http://action.earthday.net/p/dia/action3/common/public/?action_KEY=18560




## 1.5 Data Analyses

We conducted all analyses using the statistical environment *R* (version 3.5.2). We used the *R* package *car* (Fox, Weisberg, & Price, 2018) to recode variables, *psych* (Revelle, 2019) and *car* for descriptive analyses and correlations, *eRm* (Mair, Hatzinger, & Maier, 2019) for Rasch modelling, *lavaan* (Rosseel & Jorgensen, 2019) and *semTools* (semTools Contributors, 2016) for CFA and path analyses. Here, we applied robust maximum likelihood estimation with Huber-White standard errors (White, 1980). Using *boot* (Canty & Ripley, 2019), we tested all relations

for significance by applying bootstrapped confidence intervals with 1,000 samples in addition to considering *p*-values (Hayes & Scharkow, 2013).

## 2. Results

### 2.1 Randomisation check

Of the $N = 508$ participants, $n = 100$ were in the global identity + proximity condition, $n = 98$ in the global identity + distance condition, $n = 99$ in the control + proximity condition, $n = 103$ in the control + distance condition, and $n = 108$ in the no stimulus control condition. The groups did not differ in age, gender, qualification, working status, considering the UK their home, and planning to live in the UK in the future ($ps \geq .374$), indicating a successful randomisation (however, see the concerns discussed in Supplement 1.1).

### 2.2 Manipulation checks

Participants reported remembering times when they had felt close and connected to others while watching the video more when they had received the global identity video ($M = 4.25$, $SD = 1.64$) than the control video ($M = 3.67$, $SD = 1.6$, $t(398) = 3.53$, $p < .001$, $d = 0.35$). Environmental concern did not differ between conditions, indicating that the fish video (control condition) did not unintentionally raise such considerations ($p = .491$).

We conducted a 2-factorial MANOVA in order to examine main effects of the text condition on the four indicators of perceived communicated distance in the news text. Two participants had to be excluded due to missing data. Using Pillai's trace, we found a significant effect of text condition ($V = 0.19$, $F(4,391) = 22.45$, $p < .001$), no effect of the video condition ($p = .909$), and no interaction ($p = .305$). Follow-up univariate ANOVAs revealed that perceived communicated social distance was higher in the distance conditions ($M = 4.34$, $SD = 1.29$) than the proximity conditions ($M = 3.73$, $SD = 1.31$, $F(1,394) = 22.41$, $p < .001$, $d = 0.47$). Perceived communicated spatial distance was also higher in the distance conditions ($M = 4.91$, $SD = 1.24$)

than the proximity conditions ($M$ = 3.80, $SD$ = 1.30, $F$(1,394) = 76.54, $p$ < .001, $d$ = 0.87). There was no difference in perceived communicated temporal or hypothetical distance between the distance conditions ($M$ = 4.41, $SD$ = 1.26 and $M$ = 3.46, $SD$ = 1.39, respectively) and proximity conditions ($M$ = 4.41, $SD$ = 1.32, $F$(1,394) = 0.00, $p$ = .994 and $M$ = 3.23, $SD$ = 1.44, $F$(1,394) = 2.56, $p$ = .110, respectively). Thus, the intended specific manipulation of communicated socio-spatial distance was perceived by participants.

We conducted a second MANOVA for the control variables which should not differ between conditions (perceived communicated severity, relevance, reliability, comprehensibility, instrumentality). One participant had to be excluded due to missing data. Using Pillai's trace, we found no significant effect of text condition or video condition, and no interaction effect on the outcomes ($p$s ≥ .571).

### 2.3 Scale analyses

#### 2.3.1 Psychological distance of climate change

A CFA of the 4-dimensional model with a superordinate factor yielded satisfactory model fit, $\chi^2(61) = 164.76$, $p < .001$; CFI = .96; TLI = .95; RMSEA = .058, 90% CI [.049, .067]; SRMR = .046. Our research questions and hypotheses focussed on the confounded dimensions of psychological socio-spatial distance addressed by the communication strategy of proximising climate change. The CFA of the respective 2-dimensional model with correlating factors also yielded satisfactory model fit, $\chi^2(13) = 33.31$, $p$ = .002; CFI = .98; TLI = .97; RMSEA = .055, 90% CI [.039, .072]; SRMR = .016. Factor loadings were between .63 and .93.

#### 2.3.2 Relevance attributed to the news text on climate change

The CFA of the 1-dimensional model yielded satisfactory model fit, $\chi^2(5) = 5.50$, $p$ = .358; CFI = 1.00; TLI = 1.00; RMSEA = .016, 90% CI [.000, .050]; SRMR = .011. Factor loadings were between .78 and .91.

### 2.3.3 Climate protective behaviour

*Information behaviour*. We identified $n = 3$ participants with unusually high values as outliers (i.e., 1848, 5203, and 50377 sec) as they were probably caused by interruptions.

*Budget allocation.* We excluded $n = 11$ participants due to implausible values. The implausible values emerged for the following reason: We programmed a limit of £100,000 for the sum of allocated money. If the sum deviated, participants were asked to check their answers again. However, in order not to lose participants, they also had the option to choose "I don't want to change my answer" and continue with the study. We excluded $n = 11$ participants whose allocated sum exceeded £100,000.

### 2.3.4 Climate protective behavioural intention

As recommended by Kaiser and Wilson (2004), we dichotomised the answers for Rasch modelling as 0 (*never, seldom, once in a while, occasionally*) and 1 (*often, very often, always*) for climate protective behaviours and 0 (*occasionally, often, very often, always*) and 1 (*never, seldom, once in a while*) for climate damaging behaviours. Rasch modelling is a special case of the psychometric item response theory, in which items and persons form a transitive order based on item difficulty. Hence, easy behaviours are performed by many people, difficult behaviours by few people. The estimated individual person scores reflect "how far people reach" regarding climate protective behaviours (see Bond & Fox, 2007). We provided the option *cannot answer* in case certain actions were not applicable to participants' living situation. Missing values can be handled by Rasch models if a sufficient number of answers remain for estimation. Nevertheless, we had to exclude $n = 10$ people due to missing values on too many variables. The separation reliability of $R_p = .72$ was satisfactory. Item mean square infit values were between .75 and 1.17 and thus all below the recommended threshold of 1.20 for samples between 500 and 1,000 participants (Bond & Fox, 2007).

### 2.4 Relations between study variables

Table 3. *Zero-order correlations between the variables*

| Variable | 1 | 2 | 3a | 3b | 3c | 3d |
|---|---|---|---|---|---|---|
| 1. Psychological socio-spatial distance of climate change [a] | | | | | | |
| 2. Relevance attributed to news text [a] | -.20* | | | | | |
| 3. Climate protective behaviour | | | | | | |
| 3a. Information amount | .02 | .28* | | | | |
| 3b. Information time | .05 | .31* | .62* | | | |
| 3c. No. supported climate initiatives | -.28* | .35* | .17* | .25* | | |
| 3d. Budget allocated to climate initiatives | -.10* | .16* | .07 | .12* | .58* | |
| 4. Climate protective behavioural intentions [b] | -.16* | .31* | .19* | .21* | .21* | .15* |

*Note.* All correlations are Pearson correlations and based on the complete sample answering all scales ($n$ = 497), except for the correlations between relevance and all other variables as relevance was only assessed in the experimental conditions ($n$ = 392). [a] Based on factor scores, [b] based on Rasch scores, * $p < .05$.

### 2.5 Study variables in the experimental conditions

Table 4. *Descriptives of the analysed variables differentiated for the experimental conditions*

| | 1 Global identity + proximity | 2 Global identity + distance | 3 Control + proximity | 4 Control + distance | 5 No stimulus | | |
|---|---|---|---|---|---|---|---|
| Variable | *M (SD)* | *M (SD)* | *M (SD)* | *M (SD)* | *M (SD)* | *F* | *p* |
| Psychological socio-spatial distance of climate change [a] | -0.19 (1.28) | 0.39 (1.19) | -0.54 (1.24) | 0.42 (1.25) | -0.11 (1.22) | 0.22 | .638 |
| Relevance attributed to news text [a] | 0.14 (1.18) | -0.03 (1.22) | 0.01 (1.26) | -0.13 (1.37) | not assessed | 2.10 | .148 |
| Climate protective behaviour | | | | | | | |
| a. Information amount | 1.79 (1.42) | 1.55 (1.51) | 1.49 (1.41) | 1.58 (1.49) | 1.80 (1.54) | 0.02 | .890 |
| b. Information time (sec) | 45 (56) | 32 (46) | 34 (62) | 29 (41) | 44 (65) | 0.02 | .888 |
| c. No. supported climate initiatives | 1.88 (1.20) | 1.78 (1.22) | 1.91 (1.15) | 1.88 (1.27) | 2.03 (1.31) | 1.04 | .309 |
| d. Budget allocated to climate initiatives (£) | 40,654 (29,994) | 37,333 (29,696) | 42,813 (30,317) | 41,673 (30,623) | 42,346 (29,978) | 0.65 | .419 |
| Climate protective behavioural intentions [b] | -0.03 (1.09) | -0.12 (1.08) | -0.11 (0.89) | -0.32 (0.96) | -0.33 (0.90) | 6.47 | .011(*) |

*Note*. [a] Factor scores. [b] Rasch scores. (*) planned contrasts with Bonferroni correction did not reveal significant group differences.

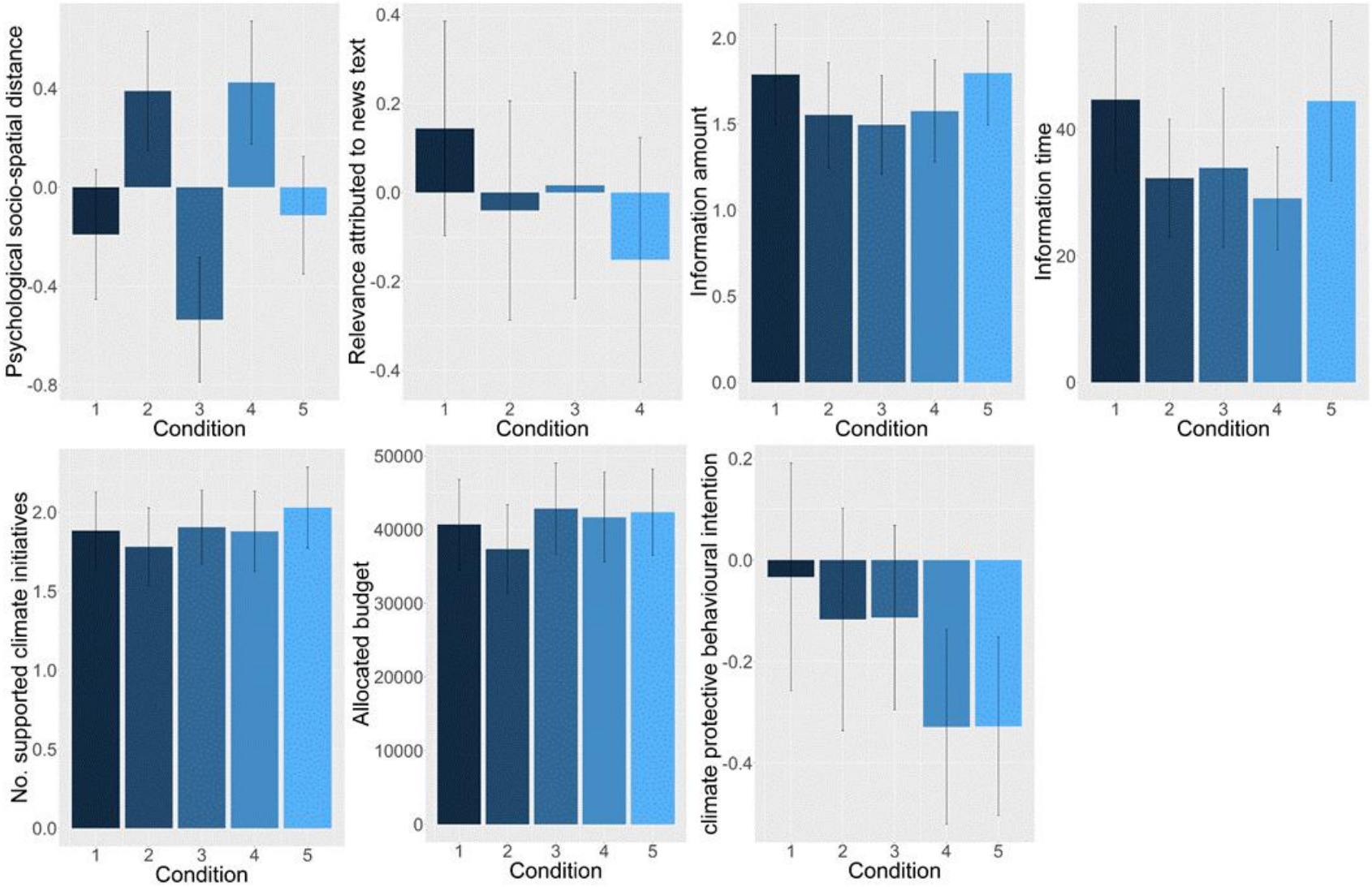



*Figure 4*. Mean scores of the variables differentiated for the experimental conditions (1 = Global identity video + proximity text, 2 = Global identity video + distance text, 3 = Control video + proximity text, 4 = Control video + distance text, 5 = no stimulus). Error bars represent 95% confidence intervals. Factor scores are displayed for psychological socio-spatial distance and relevance attributed to the news text. Rasch scores are displayed for climate protective behavioural intention.

### 2.6 Model Tests

To reduce model complexity and idiosyncratic influences of the variables, which is particularly useful for moderated models (Yang, Nay, & Hoyle, 2010), we calculated a path model using factor scores from CFAs for the psychological socio-spatial distance of climate change (centred mean of the two dimensions) and relevance attributed to the news text as well as the Rasch-based person estimates for climate protective behavioural intentions. The allocated budget variable was divided by 1,000. Text condition was coded as 0 (*communication of socio-spatial distance*) or 1 (*communication of socio-spatial proximity*). Video condition was coded as 0 (*control*) or 1 (*salience of global identity*).

### 2.6.1 Results of the unmoderated path model

Table 5. *Results of the unmoderated path model for H1 to H5*

| | Path | *B* | *SE* | *p* | 95% CI | B |
|---|---|---|---|---|---|---|
| **H1** | **Direct: PROX – PD** | **-0.77** | **0.13** | **<.001** | **[-1.02; -0.52]** | **-.30*** |
| **H2** | **Indirect: PROX – PD – REL** | **0.15** | **0.05** | **.001** | **[0.06; 0.24]** | **.06*** |
| | Direct: PROX – REL | 0.08 | 0.13 | .540 | [-0.18; 0.34] | .03 |
| | Total: PROX – REL | 0.23 | 0.13 | .074 | [-0.02; 0.48] | .09 |
| **H3a** | **Indirect: PROX – PD – REL – IA** | **0.05** | **0.02** | **.003** | **[0.02; 0.09]** | **.02*** |
| | Direct: PROX – IA | 0.09 | 0.15 | .540 | [-0.20; 0.39] | .03 |
| | Total: PROX – IA | 0.08 | 0.15 | .569 | [-0.21; 0.38] | .03 |
| **H3b** | **Indirect: PROX – PD – REL – IT** | **1.86** | **0.63** | **.003** | **[0.62; 3.09]** | **.02*** |
| | Direct: PROX – IT | 6.01 | 5.87 | .307 | [-5.51; 17.52] | .06 |
| | Total: PROX – IT | 8.81 | 5.29 | .096 | [-1.56; 19.18] | .08 |
| **H3c** | **Indirect: PROX – PD – REL – NI** | **0.04** | **0.01** | **.002** | **[0.02; 0.07]** | **.02*** |
| | Direct: PROX – NI | -0.18 | 0.12 | .116 | [-0.41; 0.05] | -.08 |
| | Total: PROX – NI | 0.07 | 0.12 | .549 | [-0.17; 0.31] | .03 |
| **H3d** | **Indirect: PROX – PD – REL – BA** | **0.97** | **0.34** | **.004** | **[0.31; 1.64]** | **.02*** |
| | Direct: PROX – BA | -3.25 | 3.00 | .279 | [-19.14; 2.64] | -.05 |
| | Total: PROX – BA | 2.43 | 3.06 | .428 | [-3.58; 8.44] | .04 |
| **H3e** | **Indirect: PROX – PD – REL – BI** | **0.03** | **0.01** | **.006** | **[0.01; 0.06]** | **.02*** |
| | Direct: PROX – BI | 0.04 | 0.10 | .698 | [-0.16; 0.23] | .02 |
| | Total: PROX – BI | 0.15 | 0.10 | .142 | [-0.05; 0.35] | .07 |
| **H4** | **Direct: GI – REL** | **0.15** | **0.13** | **.221** | **[-0.09; 0.40]** | **.06** |
| **H5a** | **Total: GI – IA** | **0.13** | **0.15** | **.366** | **[-0.16; 0.42]** | **.05** |
| | Indirect: GI – REL – IA | 0.05 | 0.04 | .213 | [-0.03; 0.14] | .02 |
| | Direct: GI – IA | 0.08 | 0.14 | .573 | [-0.20; 0.36] | .03 |
| **H5b** | **Total: GI – IT** | **7.52** | **5.32** | **.158** | **[-2.91; 17.96]** | **.07** |
| | Indirect: GI – REL – IT | 1.91 | 1.58 | .228 | [-1.19; 5.02] | .02 |
| | Direct: GI – IT | 5.61 | 5.08 | .270 | [-4.35; 15.57] | .05 |
| **H5c** | **Total: GI – NI** | **-0.00** | **0.12** | **.964** | **[-0.23; 0.22]** | **-.00** |
| | Indirect: GI – REL – NI | 0.05 | 0.04 | .222 | [-0.03; 0.12] | .02 |
| | Direct: GI – NI | -0.05 | 0.11 | .637 | [-0.27; 0.16] | -.02 |
| **H5d** | **Total: GI – BA** | **-2.05** | **2.95** | **.487** | **[-7.84; 3.73]** | **-.03** |
| | Indirect: GI – REL – BA | 1.00 | 0.81 | .220 | [-0.60; 2.60] | .02 |
| | Direct: GI – BA | -3.05 | 2.82 | .279. | [-8.57; 2.47] | -.05 |
| **H5e** | **Total: GI – BI** | **0.17** | **0.10** | **.102** | **[-0.03; 0.37]** | **.08** |
| | Indirect: GI – REL – BI | 0.04 | 0.03 | .227 | [-0.02; 0.09] | .02 |
| | Direct: GI – BI | 0.13 | 0.10 | .179 | [-0.06; 0.32] | .06 |

*Note.* PROX = Communicating proximity vs. distance in news text, PD = psychological socio-spatial distance; REL = relevance attributed to news text, IA = information amount, IT = information time, NI = number of supported climate initiatives, BA = budget allocated to climate initiatives, BI = climate protective behavioural intentions, GI = global identity made salient; * $p < .05$.

## 2.7 Moderated path model

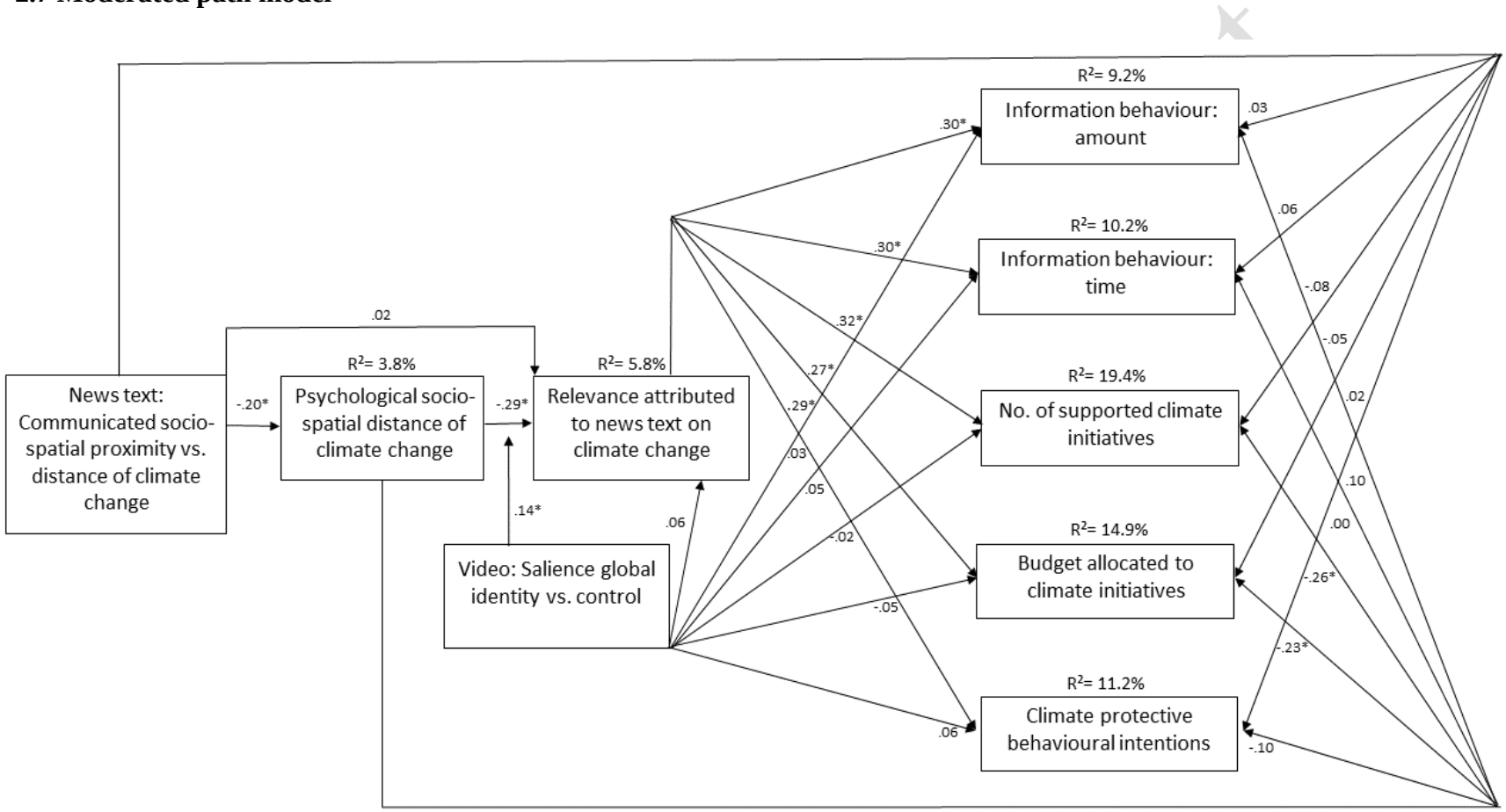



*Figure 5*. Moderated path model testing H6.
*Note*. Standardised coefficients are displayed. * $p < .05$. Residual covariances between the behavioural outcomes are not displayed to reduce complexity. Including the moderator video condition changes the interpretation of the relation between psychological socio-spatial distance and relevance attribution to a conditional relation (i.e., for people in the control condition, coded as 0) and the interpretation of the effect of video condition on relevance attribution to a conditional effect (i.e., for people with an average psychological socio-spatial distance).

## 2.8 Additional analyses

### 2.8.1 Model tests including speeders

As an additional analysis, we recalculated the unmoderated and moderated path model including speeders (see Supplement 1.1). We still excluded participants with implausible values in information behaviour or budget allocation (see Supplement 2.3.3) as well as participants for whom the Rasch score for climate protective behavioural intention could not be determined due to too many missing values (see Supplement 2.3.4). This analysis was based on $n$ = 409 participants in the experimental groups. Results slightly differed regarding the exact coefficients, but not with regard to the pattern of statistical significance (see Figures 6 and 7).

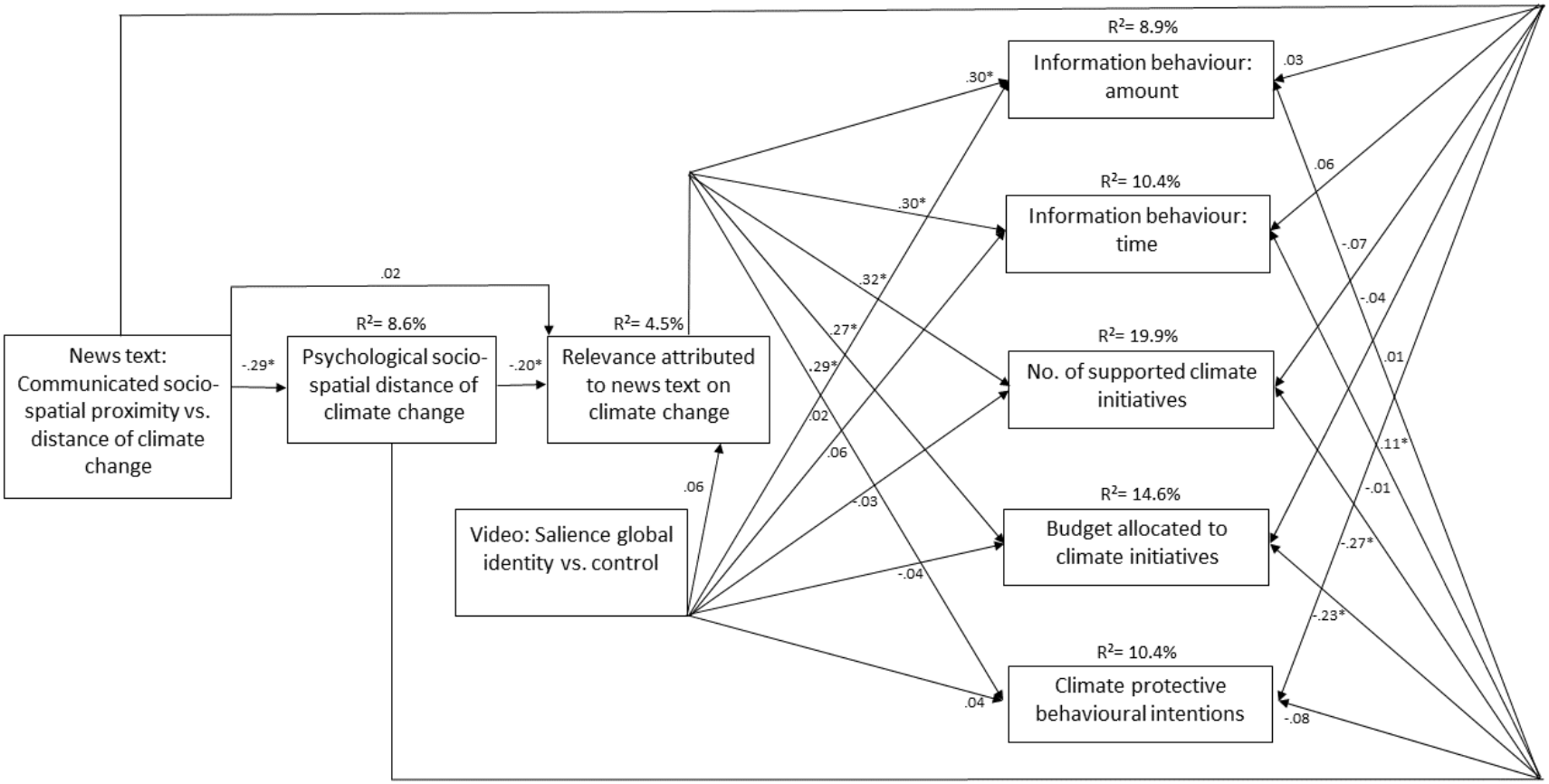



*Figure 6.* Unmoderated path model testing H1 to H5 including speeders ($n$ = 409).
*Note*. Standardised coefficients are displayed. * $p < .05$. Residual covariances between the behavioural outcomes are not displayed to reduce complexity.

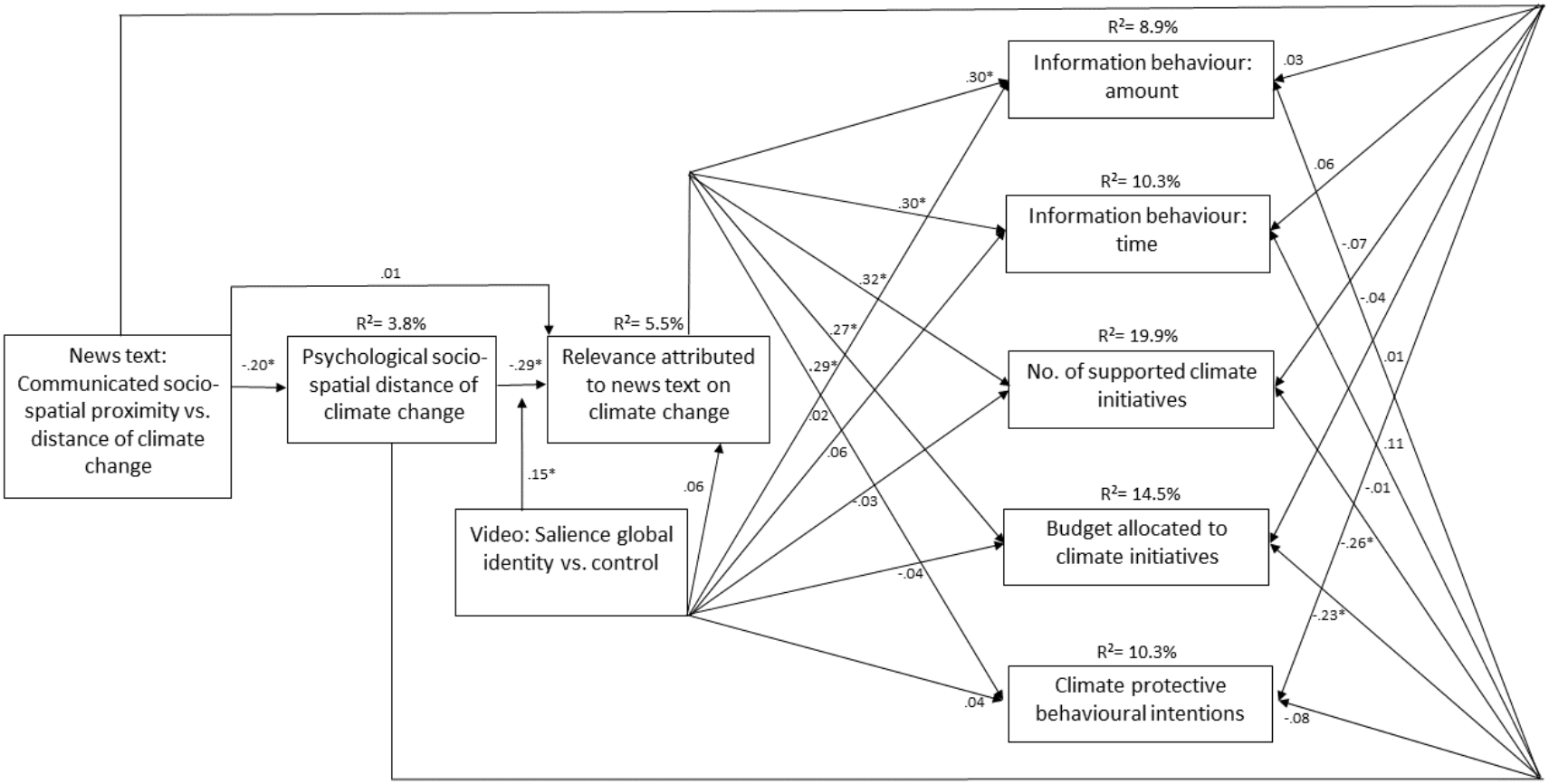



*Figure 7.* Moderated path model testing H6 including speeders ($n$ = 409).
*Note*. Standardised coefficients are displayed. * $p < .05$. Residual covariances between the behavioural outcomes are not displayed to reduce complexity. Including the moderator video condition changes the interpretation of the relation between psychological socio-spatial distance and relevance attribution to a conditional relation (i.e., for people in the control condition, coded as 0) and the interpretation of the effect of video condition on relevance attribution to a conditional effect (i.e., for people with an average psychological socio-spatial distance).

### 2.8.2 Measure of situational global identity

In an attempt to assess situational global identity, we asked participants how they "think and feel right now, in the current moment" with respect to 10 statements adapted from McFarland, Webb, and Brown (2012) and Reese, Proch, and Finn (2015). Five items covered the *global self-definition* dimension and five the *global self-investment* dimension (see Appendix). The CFA of the 2-dimensional model with correlating factors yielded satisfactory model fit with the exception of RMSEA, which just exceeded the limit of .08 recommended by Hair, Black, Babin, and Anderson (1998), $\chi^2(34) = 168.14$, $p < .001$; CFI = .95; TLI = .94; RMSEA = .088, 90% CI [.078, .098]; SRMR = .040. Factor loadings were between .77 and .95.

We examined whether making global identity salient through the video communicating global connectedness increased self-reported situational global identity. In a SEM for the 2-dimensional model, video condition did not impact the explicit measures of situational global self-definition ($p = .306$, $\beta = .05$) or global self-investment ($p = .275$, $\beta = .06$).

Both operationalisations, the video and the situational global identity measure, were based on similar prior research but new in their concrete application. It is possible that the video was not able to raise the salience of global identity, however, the manipulation check did show that the video reminded people more of times when they felt close and connected to others than the control video. A second explanation might be that the salience manipulation was too subtle to be detected by the explicit measure or that the explicit measure was positioned at the end of the questionnaire and too long after the manipulation to detect the effects. We suggest that future research address the validity of the situational global identity measure.

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## 4. Appendix

### A. Manipulation checks and control questions video

To what extent do you disagree or agree with the following statements?

Answer format: 1 = strongly disagree, 2 = mostly disagree, 3 = tend to disagree, 4 = neither disagree nor agree, 5 = tend to agree, 6 = mostly agree, 7 = strongly agree

The video reminded me of times…

1. when I had felt close and connected to others
2. when I had felt competent
3. when I had felt free and autonomous
4. when I had felt happy
5. when I had felt relaxed and calm

Control item environmental concern: How concerned, if at all, are you about the environment?

Answer format: 1 = not at all, 2 = not very much, 3 = a little, 4 = somewhat, 5 = quite a bit, 6 = very much, 7 = completely

### B. Manipulation checks and control questions news text

How does the journalist portray the topic climate change in the article?

Answer format: 1 2 3 4 5 6 7

It is mainly about…

1. the present … the future
2. people like me … other people
3. close locations … far locations
4. certain facts … uncertain opinions
5. present events … future events
6. events affecting me … events affecting others
7. events close by … events far away
8. likely events … unlikely events

Control items (communicated severity, relevance)

The journalist portrays climate change and its consequences as...

1. harmless … dangerous
2. weak … strong
3. unimportant … important

Control items (instrumentality)

4. I can personally help to reduce climate change by changing my behaviour
5. I personally feel that I can make a difference with regard to climate change

### C. Measure of situational global identity

In the following, we are interested how you think and feel right now, in the current moment.

Answer format: 1 = not at all, 2 = not very much, 3 = a little, 4 = somewhat, 5 = quite a bit, 6 = very much, 7 = completely

Right now, in the current moment…

Global self-definition

1. I feel close to people all over the world
2. I think of people all over the world as "we"
3. I feel like I have a lot in common with people all over the world
4. I feel as if people all over the world are one community
5. I identify with people all over the world

Global self-investment

1. I empathize with people all over the world when bad things happen
2. I feel like I care about people all over the world
3. I feel the need to be a responsible citizen of the world
4. I feel loyal towards people all over the world
5. I want to help people all over the world