COMMUNICATING CLIMATE CHANGE
HOW PROXIMISING CLIMATE CHANGE AND GLOBAL IDENTITY PREDICT ENGAGEMENT

Dissertation

Submitted in fulfilment of the requirements for the degree

"Doctor Rerum Socialium"

(Dr. rer. soc.)

to the

Faculty of Business, Economics and Social Sciences

University of Hohenheim

Laura Sophia Loy

Supervisor: Prof. Dr. Sabine Trepte

Institute of Communication Science

Department of Media Psychology (540F)

~ Stuttgart 2018 ~

This thesis was accepted as a doctoral thesis (dissertation) in fulfilment of the requirements for the degree "Doctor Rerum Socialium" (Dr. rer. soc.) by the Faculty of Business, Economics and Social Sciences, University of Hohenheim, Stuttgart, Germany.

Dean of the Faculty of Business, Economics and Social Sciences

Prof. Dr. Karsten Hadwich

Supervisor and primary reviewer

Prof. Dr. Sabine Trepte

Secondary reviewer

Prof. Dr. Anna Steidle

Chair of the oral examination

Prof. Dr. Marion Büttgen

Submission

19 July 2018

Oral examination

9 October 2018

Contents

Tables ... 9
Figures ... 10
Abbreviations ... 11
Acknowledgements ... 15
Abstract ... 17

1. Introduction ... 19

2. Background ... 25

2.1 Sustainability communication ... 25

2.2 Climate change communication ... 28
2.2.1 Climate change in the news ... 32
2.2.2 Research on climate change communication ... 33
2.2.3 Communication strategies to increase public engagement with climate change ... 35

2.3 Proximising climate change as a communication strategy ... 38
2.3.1 Construal level theory of psychological distance ... 39
2.3.2 Psychological distance and climate change ... 43
2.3.3 Assumed process behind proximising climate change ... 48
2.3.4 Communicating proximity in media effects theory and research ... 50
2.3.5 Empirical findings on proximising climate change ... 54
2.3.5.1 Experiments on communicating socio-spatial proximity vs. distance ... 54
2.3.5.2 Impact of proximising on psychological socio-spatial distance of climate change. 60
2.3.5.3 Impact of proximising on issue relevance of climate change ... 61
2.3.5.4 Impact of proximising on climate protective behaviour ... 63
2.3.5.5 Impact of proximising on climate change knowledge ... 69
2.3.5.6 Relation between climate change knowledge and climate protective behaviour ... 71

2.4 Proximising climate change in the current approach ... 75
2.4.1 Communicating socio-spatial proximity of climate change ... 75
2.4.2 Psychological socio-spatial distance of climate change ... 77
2.4.3 Relevance attributed to the climate change issue ... 79
2.4.4 Climate protective behaviour ... 80
2.4.5 Climate change knowledge ... 85

2.5 Global identity and climate change communication ... 89
2.5.1 Theoretical conceptualisation of global identity ... 90
2.5.2 Global identity and climate change ... 93

2.5.3 Situational salience of global identity ... 99
2.5.4 Global identity and psychological socio-spatial distance ... 102
2.6 Global identity in the current approach ... 104
3. Overview of the current approach ... 113
3.1 Concepts and hypotheses ... 113
3.2 Study designs ... 118
3.3 Statistical analyses ... 118
3.3.1 Missing values and implausible values ... 119
3.3.2 Descriptive analyses, exploration of assumptions, correlation, and regression ... 119
3.3.3 Structural equation modelling ... 120
3.3.4 Rasch modelling ... 122
3.3.5 Analyses of variance ... 125
4. Study 1: Online survey ... 127
4.1 Background ... 127
4.1.1 Specific aims of the study ... 127
4.1.2 Main research questions and hypotheses ... 127
4.1.3 Additional research question ... 130
4.2 Method ... 130
4.2.1 Participants ... 130
4.2.2 Design and procedure ... 132
4.2.3 Measures ... 132
4.2.3.1 Perceived communicated distance of climate change in news coverage ... 134
4.2.3.2 Psychological distance of climate change ... 134
4.2.3.3 Relevance attributed to the climate change issue ... 136
4.2.3.4 Climate change knowledge ... 137
4.2.3.5 Climate protective behaviour ... 138
4.2.3.6 Contact with the climate change issue in communication ... 139
4.2.3.7 Social identity, including global identity ... 142
4.3 Results ... 143
4.3.1 Main research questions and hypotheses ... 143
4.3.1.1 Models including the self-definition dimension of global identity ... 144
4.3.1.2 Models including the self-investment dimension of global identity ... 152
4.3.2 Additional research question and analyses ... 157
4.3.2.1 Global identity and psychological socio-spatial distance ... 157

4.3.2.2 Contact with the climate change issue in communication ... 157

4.4 Discussion ... 161

4.4.1 Summary of results ... 161

4.4.1.1 Main research questions and hypotheses ... 161

4.4.1.2 Additional research question ... 164

4.4.2 Limitations and implications for developing Study 3 ... 166

5. Study 2: Laboratory experiment ... 168

5.1 Background ... 168

5.1.1 Specific aims of the study ... 168

5.1.2 Main research questions and hypotheses ... 168

5.2 Method ... 170

5.2.1 Participants ... 170

5.2.2 Design and procedure ... 171

5.2.3 Stimulus material ... 172

5.2.4 Measures ... 173

5.2.4.1 Psychological distance of climate change ... 175

5.2.4.2 Relevance attributed to the news text on climate change ... 176

5.2.4.3 Climate change knowledge ... 176

5.2.4.4 Climate protective behaviour ... 178

5.2.4.5 Social identity, including global identity ... 179

5.2.4.6 Contact with the climate change issue in the media ... 181

5.2.4.7 Manipulation check and control questions ... 181

5.3 Results ... 182

5.3.1 Relations of study variables ... 182

5.3.2 Randomisation and manipulation check ... 182

5.3.3 Main research questions and hypotheses ... 183

5.3.3.1 Models including the self-definition dimension of global identity ... 184

5.3.3.2 Models including the self-investment dimension of global identity ... 190

5.3.4 Additional analyses ... 194

5.3.4.1 Global identity and psychological socio-spatial distance ... 194

5.3.4.2 Impact of exposure to the news text on climate change ... 194

5.3.4.3 Contact with the climate change issue in the media ... 196

5.4 Discussion ... 196

5.4.1 Summary of results ... 196

5.4.1.1 Main research questions and hypotheses ... 196

5.4.1.2 Additional analyses ... 199
5.4.2 Limitations and implications for developing Study 3 ... 199

6. Study 3: Online Experiment ... 202

6.1 Background ... 202
6.1.1 Specific aims of the study ... 202
6.1.2 Main research questions and hypotheses ... 203
6.1.3 Additional research questions ... 204

6.2 Method ... 204
6.2.1 Participants ... 204
6.2.2 Design and procedure ... 206
6.2.3 Stimulus material ... 207
6.2.3.1 Video varying in communicated feeling of connectedness ... 207
6.2.3.2 News text varying in communicated socio-spatial distance of climate change ... 208
6.2.4 Measures ... 209
6.2.4.1 Psychological distance of climate change ... 211
6.2.4.2 Relevance attributed to the news text on climate change ... 213
6.2.4.3 Climate change knowledge ... 213
6.2.4.4 Climate protective behaviour ... 217
6.2.4.5 Situational global identity ... 222
6.2.4.6 Global connectedness ... 222
6.2.4.7 Construal level ... 223
6.2.4.8 Contact with the climate change issue in the media ... 224
6.2.4.9 Manipulation checks and control questions ... 226

6.3 Results ... 227
6.3.1 Relations of study variables ... 227
6.3.2 Randomisation and manipulation checks ... 229
6.3.3 Main research questions and hypotheses ... 230
6.3.4 Additional research questions and analyses ... 238
6.3.4.1 Effect of video condition on measure of global identity salience ... 238
6.3.4.2 Construal level ... 238
6.3.4.3 Path models including the measure of global identity salience ... 238
6.3.4.4 Video condition and psychological socio-spatial distance ... 244
6.3.4.5 Impact of exposure to the news text on climate change ... 244

6.4 Discussion ... 246
6.4.1 Summary of results ... 246
6.4.1.1 Main research questions ... 246

6.4.1.2 Additional research questions 249
6.4.2 Limitations and implications for future research 250

7. General discussion 253

7.1 Summary of results 253
7.1.1 Is proximising climate change a promising communication strategy? 253
7.1.2 Reducing the distance or bridging it through global identification? 258
7.1.3 Can communicating knowledge support climate protective behaviour? 262

7.2 Methodical contributions extending prior research 265

7.3 Theoretical implications 267
7.3.1 Proximising and the psychological distance of climate change 267
7.3.2 Global identity perspective on climate change 269

7.4 Limitations and suggestions for future research 271
7.4.1 Samples 271
7.4.2 Designs 272
7.4.3 Stimuli 273
7.4.3.1 Communicating proximity of climate change 273
7.4.3.2 Salience of global identity 276
7.4.4 Measures 278
7.4.4.1 Climate protective behaviour 278
7.4.4.2 Climate change knowledge 279
7.4.4.3 Climate change-related construal level 280
7.4.5 Extensions 280

7.5 Practical implications 281
7.5.1 Communicating climate change 281
7.5.2 Developing a global identity 282

8. Conclusion 283

References 285

Websites 310

Appendix 311

1. Measures Study 1 311

1.1 Perceived communicated distance of climate change in news coverage 311
1.2 Psychological distance of climate change 311
1.3 Relevance attributed to the climate change issue 311

1.4 Climate change knowledge 312
1.5 Climate protective behaviour 313
1.6 Social identity, including global identity 314
1.7 Contact with the climate change issue in communication...................................316

2. Measures Study 2 317
2.1 Psychological distance of climate change 317
2.2 Relevance attributed to the news text on climate change 317
2.3 Climate change knowledge 318
2.4 Climate protective behaviour 320
2.5 Social identity, including global identity 322
2.6 Perceived communicated distance of climate change in the news text...........323
2.7 Contact with the climate change issue in the media 323
2.8 Awareness check...324

3. Stimulus texts Study 2 325
3.1 News text communicating proximity of climate change 325
3.2 News text communicating distance of climate change 326

4. Stimulus texts Study 3 327
4.1 News text communicating proximity of climate change 327
4.2 News text communicating distance of climate change 328

5. Screenshots information behaviour measure Study 3 329

Curriculum Vitae...330

Tables

Table 1. Measures of global identity 108

Table 2. Conceptualisations and operationalisations 115

Table 3. Demographic characteristics of the sample in Study 1 resulting from the quota procedure compared to the German population 131

Table 4. Psychometric properties of the measures used in Study 1 133

Table 5. Contact with the climate change issue in communication in Study 1 141

Table 6. Zero-order correlations between the variables of Study 1 143

Table 7. Relation between contact with the climate change issue in communication and the main variables of Study 1 (Spearman's rho) 159

Table 8. Multiple regression analyses for contact with the climate change issue in communication and the main variables of Study 1 160

Table 9. Psychometric properties of the measures used in Study 2 174

Table 10. Zero-order correlations between the variables of Study 2 182

Table 11. Dependent variables in the three experimental conditions of Study 2 195

Table 12. Demographic characteristics of the sample in Study 3 resulting from the quota procedure compared to the UK population 206

Table 13. Psychometric properties of the measures used in Study 3 210

Table 14. Measure of psychological distance of climate change in Study 3 212

Table 15. Measure of climate change knowledge in Study 3 214

Table 16. Measure of budget allocation in Study 3 219

Table 17. Measure of climate protective behavioural intentions in Study 3 221

Table 18. Contact with the climate change issue in the media in Study 3 225

Table 19. Zero-order correlations between the variables of Study 3 228

Table 20. Dependent variables in the five experimental conditions of Study 3 245

Figures

Figure 1. Assumed process behind the communication strategy of proximising climate change. 50

Figure 2. First step of the assumed process behind the communication strategy of proximising climate change. 60

Figure 3. Second step of the assumed process behind the communication strategy of proximising climate change. 61

Figure 4. Third step of the assumed process behind the communication strategy of proximising climate change (climate protective behaviour) 64

Figure 5. Third step of the assumed process behind the communication strategy of proximising climate change (climate change knowledge) 69

Figure 6. Assumed impact of global identity as a trait. 98

Figure 7. Assumed impact of global identity salience. 102

Figure 8. Assumed moderating impact of global identity as a trait. 103

Figure 9. Assumed moderating impact of global identity salience. 104

Figure 10. Overview of models examined in Study 1. 129

Figure 11. Unmoderated path models in Study 1 including the self-definition dimension of global identity and personal/societal relevance, respectively. 145

Figure 12. Moderated path models in Study 1 including the self-definition dimension of global identity and personal/societal relevance, respectively. 151

Figure 13. Unmoderated path models in Study 1 including the self-investment dimension of global identity and personal/societal relevance, respectively 154

Figure 14. Moderated path models in Study 1 including the self-investment dimension of global identity and personal/societal relevance, respectively. 156

Figure 15. Unmoderated path model in Study 2 including the self-definition dimension of global identity. 185

Figure 16. Moderated path model in Study 2 including the self-definition dimension of global identity. 189

Figure 17. Unmoderated path model in Study 2 including the self-investment dimension of global identity. 192

Figure 18. Moderated path model in Study 2 including the self-investment dimension of global identity. 193

Figure 19. Unmoderated path model in Study 3 including the predictor video condition (connectedness vs. control). 236

Figure 20. Moderated path model in Study 3 including the moderator video condition (connectedness vs. control). 237

Figure 21. Path model in Study 3 including the self-definition dimension of global identity salience. 242

Figure 22. Path model in Study 3 including the self-investment dimension of global identity salience. 243

Abbreviations

CLT	Construal level theory
CO_2	Greenhouse gas carbon dioxide
CTT	Classical test theory
ELM	Elaboration likelihood model
GEB	General Ecological Behaviour (scale)
H	Hypothesis
IPCC	Intergovernmental Panel on Climate Change
IRT	Item response theory
IWAH	Identification with all humanity
MRCML	Multidimensional random coefficients multinomial logit (model)
OECD	Organisation for Economic Cooperation and Development
R	Statistical environment *R*
RQ	Research question
SCT	Self-categorisation theory
SIMPEA	Social identity model of proenvironmental action
SIT	Social identity theory
TPB	Theory of planned behaviour
UN	United Nations
WCED	World Commission on Environment and Development

Statistical annotations and abbreviations

α	Internal consistency Cronbach's alpha
β	Standardised regression coefficient beta
δ	Rasch model-based item parameter delta (difficulty)
η_p^2	Effect size partial eta-squared
ω	Internal consistency omega according to Raykov
ω^2	Effect size omega squared for *F*-tests
ψ	Standardised residual covariance psi
θ	Rasch model-based person parameter theta
χ^2	Chi-square test statistic

ANOVA	Univariate analysis of variance
AVE	Average variance extracted
B	Unstandardised regression coefficient
CFA	Confirmatory factor analysis
CFI	Comparative fit index
CI	Confidence interval
CML	Conditional maximum likelihood
d	Effect size Cohen's d
EAP	Expected a posteriori measure
F	F-ratio test statistic
f^2	Effect size Cohen's f^2
H	Test statistic for robust MANOVA method by Choi and Marden
JML	Joint maximum likelihood
M	Mean
MANOVA	Multivariate analysis of variance
Md	Median
ML	Maximum likelihood
MV	Missing values
N	Complete sample size
n	Subsample size
p	Level of statistical significance
q	Number of parameters estimated in a SEM
r	Unspecified correlation coefficient
r_P	Pearson's correlation coefficient
r_S	Spearman's rank correlation coefficient
R^2	Coefficient of determination (i.e., explained variance)
R_p	Rasch model-based person separation reliability
r_{TT}	Test-retest reliability
RMSEA	Root mean square error of approximation
SD	Standard deviation
SE	Standard error
SEM	Structural equation model(ling)
SRMR	Standardised root mean square residual

t	Test statistic for Student's t-test
TLI	Tucker-Lewis index
UML	Unconditional maximum likelihood
V	Pillai's trace test statistic (for MANOVA)
W^*	Test statistic for the Shapiro-Wilk test for multivariate normality

Acknowledgements

I thank Prof. Dr. Sabine Trepte for supervising this dissertation. I am specifically grateful that she gave me the opportunity to work in her team at the University of Hohenheim, to pursue my personal research interest, to attend conferences and discuss my work there, to take opportunities to learn about new methods, for providing me support by student assistants to conduct laboratory experiments, and for her critical and constructive feedback on the first draft of this work. I thank Prof. Dr. Anna Steidle for her interest in my research, for agreeing to be the second reviewer of this dissertation and for inviting me to discuss my work with her. I thank Prof. Dr. Alexa Spence for warmly welcoming me at the University of Nottingham and for collaborating with me to conduct Study 3 of this dissertation. I am specifically grateful for her deliberate feedback on my ideas and her additional input, her positive motivation, and for organising financial support of the project. I thank Prof. Dr. Florian Kaiser for the time in his team at the University of Magdeburg before starting this dissertation and the intellectual inspiration I received there.

I thank my Hohenheim team colleagues: Doris, for the numerous hours in and out of our shared office and for her help and encouragement in the most difficult phases, Philipp, Tobias, Josi, Max, Susanne, Neli, Thilo, Michael, and Frank for the valuable time spent together and the support I received. Moreover, I thank the students Sophie and Dari who helped me to conduct my research, the colleagues of the Institute of Communication Science for making the years in Hohenheim an enriching experience, and the staff of the university administration for their organisational support. I also thank my colleagues in Magdeburg and Nottingham for sharing important parts of the path.

I thank my family and friends, specifically Mira and my parents, Patrick, Max, Florentine, Nina, Rebekka, Maren, and Siegmar for their support, feedback, advise, phone calls, hours spent with me in the library, and distraction from writing in the evenings.

I thank Keri Hartman for professionally proof-reading the originally submitted version of this dissertation as a native speaker for this final publication.

Abstract

The majority of scientists express an urgent need to limit climate change in order to ensure sustainable development, but our societies are not reacting decisively enough to achieve this goal. My research aims to understand how news about climate change can be communicated to convey scientific knowledge and support climate protection.

Proximising climate change by focussing on local instead of global or remote consequences has been recommended as a promising communication strategy. The reasoning is that many people seem to perceive climate change as a phenomenon that affects mainly other people in far-off places (i.e., *psychological socio-spatial distance*). Proximising might bring climate change closer. However, the recommendation still lacked convincing empirical evidence. Thus, my research investigated the communication of proximity vs. distance in news coverage. Specifically, I examined the process assumed to be behind proximising effects, namely a reduction of the psychological socio-spatial distance of climate change, which might increase issue relevance and in turn promote climate protective behaviour and climate change knowledge. In Study 1 (N = 498), people were asked to what extent the news communicated climate change as something affecting mainly other people in distant locations. The more they perceived news communication as socio-spatially distant, the higher their psychological socio-spatial distance of climate change and the lower relevance they attributed to the issue. Perceived communicated socio-spatial distance was indirectly and negatively related with climate protective behavioural knowledge through higher psychological socio-spatial distance. Study 2 (N = 99) found no evidence that communicating socio-spatial proximity vs. distance of climate change in a news text influences psychological socio-spatial distance, relevance attributed to the news text, climate protective behaviour, and climate change knowledge. However, the test power was not sufficient to detect small effect sizes. In Study 3 (N = 508), proximising climate change in a news text decreased the psychological socio-spatial distance of climate change, indirectly and positively predicted the relevance attributed to the news text through lower psychological socio-spatial distance, and indirectly and positively predicted climate protective behaviour as well as climate change knowledge through lower psychological socio-spatial distance and higher relevance attribution. While the relations were small, stronger relations might arise if people repeatedly receive local information. I thus suggest that it is worthwhile to complement news about global climate change with reports about regional impacts.

As a second objective, I aimed to illuminate whether the concept of a *global identity* helps to explain why proximising might not always be necessary or useful. I assumed that the more people identify with people all over the world, the more relevant they evaluate climate change to be and the more they are motivated to take climate protective action and acquire climate change knowledge. Moreover, I supposed that people with a strong global identity might evaluate climate change as relevant regardless of whether they perceive that the consequences mainly affect other people in distant places. In other words, a global identity might *bridge* the psychological socio-spatial distance of climate change. In Study 1, global identity positively predicted the relevance attributed to climate change and climate protective behaviour, as well as climate change knowledge indirectly through relevance attribution. In Study 2, the global identity dimension of self-investment positively predicted climate protective behaviour. However, global identity did not bridge the psychological socio-spatial distance of climate change in either study.

I further reasoned that the negative relation between psychological socio-spatial distance and relevance attribution might be weaker if global identity is made salient. In other words, a salient global identity might bridge the psychological socio-spatial distance of climate change. In Study 3, before reading the news text, participants watched either a control video or a video showing a man dancing with people all over the world, which communicated a feeling of connectedness. While participants who received the control video evaluated the news text as less relevant as their psychological socio-spatial distance of climate change increased, there was no such relation among participants who received the connectedness video. Moreover, communicated proximity vs. distance in the news text did not indirectly predict climate protective behaviour and climate change knowledge in the latter group. This suggests that communicating a feeling of connectedness might be a way to bridge the distance of climate change communication and render issues that are perceived as affecting mainly other people in far-off locations more relevant to recipients.

In summary, my work provides evidence for the usefulness of two communication strategies: reducing the psychological socio-spatial distance of climate change by means of proximising the issue in news coverage and bridging the psychological socio-spatial distance of climate change by communicating connectedness among people. Moreover, it gives insights into the role of global identity as an individual trait in the context of climate change communication.

1. Introduction

"We must recognize, in our day-to-day lives and in our governing institutions, that Earth with all its life is our only home" (Ripple et al., 2017, p. 1028). This call was expressed by more than 15,000 scientists in a recent warning to humanity that our home is threatened to an alarming extent. Since the 1980s, scientists and politicians have been discussing sustainable development, which involves responsible interaction between humans and their natural and social environment, as a societal goal to protect the Earth. Sustainable development should satisfy the needs of current generations without compromising the needs fulfilment of future generations in all parts of the world (WCED, 1987). It is often described as encompassing three interacting dimensions: ecological, social, and economic sustainability. With growing global interconnectedness, societies today face several challenges to sustainable development in all three dimensions. Examples include a loss of resources and biodiversity, population growth, migration, poverty, and a lack of education and health. These challenges have given rise to numerous scientific efforts to understand their origins, monitor their progression, and develop possible solutions. The results of these efforts need to be discussed in public discourse in order for them to have an impact on society. *Sustainability communication* can thus be defined as a process of communication and social understanding aimed at a vision of a sustainable future (Godemann & Michelsen, 2011a).

Recent research has focussed strongly on climate change as a major challenge for all three dimensions of sustainable development. Climate change is particularly important because it intensifies many of the other challenges (IPCC, 2014). The vast majority of scientists indicate that there is an urgent need to limit climate change in order to secure our quality of life on Earth. At the same time, they have noticed that our societies have not reacted as quickly and decisively as required to achieve this goal (Maibach, Myers, & Leiserowitz, 2014). My research is thus concerned with *climate change communication* as an example for sustainability communication (Moser, 2010). I focus on the communication of scientific findings regarding climate change and possible solutions aimed at motivating public engagement. The central means for such communication are news media (Brüggemann, Neverla, Hoppe, & Walter, 2018), and thus I specifically address the *portrayal of climate change in news coverage*. With my research, I aim to contribute to understanding how news about climate change can best be communicated in order to reach its audience, convey scientific knowledge, and motivate public engagement for climate protection.

Focussing on local instead of global or spatially remote consequences has been recommended as a promising communication strategy for engaging the public with climate change (e.g., van der Linden, Maibach, & Leiserowitz, 2015). This strategy has been termed *proximising climate change* (Brügger, Morton, & Dessai, 2016). The implicit reasoning behind this recommendation is that communicating proximity might reduce the common perception that climate change is a phenomenon that primarily impacts other people in remote places. Hence, proximising climate change might decrease the distance associated with climate change (Spence, Poortinga, & Pidgeon, 2012). The more individuals perceive of climate change as affecting their local area and themselves or people living close by, the more relevant they might evaluate the issue. This might in turn predict their acquisition of knowledge on the topic and behavioural engagement in climate protection (Brügger, Dessai, Devine-Wright, Morton, & Pidgeon, 2015; Scannell & Gifford, 2013).

This argument is theoretically embedded in the construal-level theory of psychological distance (CLT, Trope & Liberman, 2010). Here, *psychological distance* is defined as a subjective perception that an object or event is far away from the self on four dimensions: psychological spatial distance, social distance, temporal distance, and hypothetical distance or uncertainty. Psychological distance influences emotions, cognitions, and behaviours towards objects or events (Liberman & Trope, 2008). Relating CLT to climate change, psychologists have argued that climate change is for many people inherently distant (Milfont, 2010; Spence et al., 2012). From a European perspective, the impacts are expected to mostly affect other people in remote parts of the world and to occur in the future. Moreover, our knowledge of climate change relies to a considerable extent on prognostic research, which unavoidably involves a degree of hypotheticality. Accordingly, prior research has shown that climate change and other environmental threats are rather psychologically distant on the four dimensions suggested by CLT (i.e., they are perceived as occurring in far-off places, to others, in the future, and being uncertain in nature; see e.g., Fleury-Bahi, 2008; Leiserowitz, Maibach, Roser-Renouf, & Smith, 2010; Lorenzoni, Nicholson-Cole, & Whitmarsh, 2007; Lorenzoni & Pidgeon, 2006; Pahl, Sheppard, Boomsma, & Groves, 2014; Poortinga, Spence, Whitmarsh, Capstick, & Pidgeon, 2011; Smith & Leiserowitz, 2012; Zwick & Renn, 2002).

In the language of CLT, the strategy of proximising climate change aims at decreasing the *psychological socio-spatial distance of climate change* (i.e., the perception that climate change mainly affects other people in remote places) by *communicating socio-spatial proximity of climate change* (i.e., local consequences for the audience). This reduction in psychological socio-spatial distance is thought to increase the *relevance attributed to the climate change issue.* The more relevant people evaluate the communicated issue of climate change, the more they might be motivated to engage in *climate protective behaviour* and acquire *climate change knowledge* from news portrayals of scientific findings.

However, experimental research has yielded inconsistent results on the effects of communicating proximity vs. distance of climate change consequences (Brügger et al., 2016; Hart & Nisbet, 2012; Jones, Hine, & Marks, 2017; Scannell & Gifford, 2013; Schoenefeld & McCauley, 2016; Shwom, Dan, & Dietz, 2008; Spence & Pidgeon, 2010; Wiest, Raymond, & Clawson, 2015). McDonald, Chai, and Newell (2015) recently concluded that "psychological proximity does not always lead to more concern about or action on climate change. Despite its emphasis, psychological distance has not been widely studied in experimental work in the climate change context, and there is a need for more systematic examination of its effects" (p. 109). In my research, I aimed to theoretically understand these inconsistent results and extend them with an empirical correlational study followed by an experimental approach. By providing evidence on whether proximising climate change in news portrayals can motivate climate protective behaviour and climate change knowledge, I aimed to illuminate whether it is a useful communication strategy for scientists and journalists who wish to engage the public concerning climate change. From a broader perspective, I thereby seek to contribute to the societal goal of sustainable development through climate protection.

When analysing the existing experimental research on proximising climate change, I noticed that the question of whether communicating socio-spatial proximity decreases people's psychological socio-spatial distance of climate change in the first place cannot be reliably answered. Few studies included a measure of psychological distance (for exceptions, see Brügger et al., 2016; Jones et al., 2017). It was therefore unclear whether psychological socio-spatial distance is related to examined outcomes such as climate protective behaviour or climate change knowledge.

Thus, as a first contribution extending prior research, I sought to clarify the effect of communicating socio-spatial proximity vs. distance of climate change in news coverage on recipients' psychological socio-spatial distance of climate change. In the experimental studies I conducted, people were provided with a news text communicating either proximity (i.e., local consequences) or distance (i.e., global consequences) of climate change. With the aim of disentangling prior inconsistent results, I additionally assessed recipients' *perceived communicated socio-spatial distance of climate change* in this news coverage. This made it possible to determine whether the communicated proximity in the news text is recognised, and whether it translates into reduced psychological socio-spatial distance of climate change. Moreover, I sought to model and examine the *process behind possible effects of proximising climate change,* which has rarely been explicitly addressed by prior research (for an exception, see Jones et al., 2017). Specifically, I examined whether communicating socio-spatial proximity of climate change reduces the psychological socio-spatial distance of climate change, which might in turn increase the relevance attributed to the issue, which might in turn predict climate protective behaviour and climate change knowledge.

Second, I reasoned that psychological socio-spatial distance of climate change might not make the issue irrelevant for everyone. Relatedly, Brügger, Dessai et al. (2015) recently argued that CLT does not necessarily imply simple main effects of psychological distance. For example, people tend to evaluate distant events more in line with their core values than closer events (Ledgerwood, Trope, & Chaiken, 2010). Hence, individuals' values can moderate the effect of psychological distance on their evaluation of issues. I assumed that, similarly to values, people's identity might affect how distant events are evaluated. Specifically, individuals who strongly identify with people in remote parts of the world might consider the consequences for close and remote locations and people equally or almost equally relevant. In other words, they might be able to *bridge the psychological socio-spatial distance* (see also Brügger, Dessai 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 experience with affected people (see Brügger, Dessai et al., 2015, for a similar thought). More specifically, I hypothesised that the effect might depend on individuals' *global identity*, which implies a definition of the self as part of all humanity and a concern and caring for the well-being of all humans (McFarland, Webb, & Brown, 2012).

There has been growing interest lately in studying identity processes on a global level. For example, research has shown that a global identity is positively related to behaviours like cross-national cooperation in public goods dilemmas (Buchan et al., 2011), self-reported proenvironmental behaviour (Lee, Ashton, Choi, & Zachariassen, 2015), fair trade consumption (Reese & Kohlmann, 2014), and support of environmental movements (Leung, Koh, & Tam, 2015). Moreover, it was found to be associated with climate change-related outcomes such as concern for global warming (Katzarska-Miller, Reysen, Kamble, & Vithoji, 2012) and collective action intentions on behalf of climate change victims (Barth, Jugert, Wutzler, & Fritsche, 2015). I aimed to extend these findings by investigating whether global identity is related to the relevance attributed to the climate change issue in news coverage, climate protective behaviour, and climate change knowledge. Moreover, I examined whether people with a strong global identity consider climate change to be a relevant issue even when they perceive that it mainly affects other people in remote parts of the world.

If a strong global identity does indeed facilitate engagement with climate change, the question arises as to whether global identity is a stable trait or whether it can be situationally influenced by communication. Self-categorisation theory (SCT, Turner, Hogg, Oakes, Reicher, & Wetherell, 1987) assumes 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. Media have the potential to make different aspects of their recipients' identities salient, and identity processes, in turn, can influence media effects (Trepte, 2006; Trepte & Loy, 2017). Hence, making a global identity salient through communicative means might influence how individuals react to news about climate change in terms of relevance attribution, knowledge gained, and climate protective behaviour. Therefore, I examined in my research whether the psychological socio-spatial distance of climate change can be bridged via communicative means. Specifically, I examined whether receiving a video portraying the connectedness of people all over the world could exert such a bridging effect.

To sum up the contribution of this work, I provide insights into the usefulness of two interconnected communication strategies to engage the public with respect to climate change. The first strategy consists of *reducing the psychological socio-spatial distance of* *climate change* by means of proximising the issue in news coverage. The second strategy consists of *bridging the psychological socio-spatial distance of climate change* by raising the salience of people's global identity as someone who is part of the inclusive ingroup of humanity. Moreover, I provide first insights into the role of global identity as a trait in the context of climate change communication. From a theoretical perspective, my findings contribute to the conceptualisation of the process behind proximising climate change in communication (Brügger et al., 2016) and to a social identity perspective on climate change (Fritsche, Barth, Jugert, Masson, & Reese, 2018). From a societal and practical perspective, they can help us understand how communication can be structured to motivate people's engagement with climate change.

In the following sections, I introduce the concepts of sustainability communication (Chapter 2.1) and climate change communication (Chapter 2.2). I explain why I focus on news as a means of climate change communication (Chapter 0), classify my work within the research tradition on climate change communication in general (Chapter 2.2.2) and on communication strategies to raise public engagement in particular (Chapter 2.2.3), before outlining the specific communication strategy of proximising climate change (Chapter 2.3). Here, I describe the theoretical foundation of the strategy (Chapter 2.3.1) and how it has been related to climate change (Chapter 2.3.2). I deduce the process behind proximising climate change (Chapter 2.3.3) and locate the strategy within media effects theory and research (Chapter 2.3.4). Finally, I summarise empirical findings and infer hypotheses for my work (Chapter 2.3.5). In Chapter 2.4, I outline my research approach for examining the usefulness of proximising climate change.

In the second theoretical part of my work (Chapter 2.5), I introduce the concept of a global identity (Chapter 2.5.1) and its assumed relation to climate change communication (Chapter 2.5.2). Next, I argue why a situational conceptualisation of global identity might be a valuable extension beyond studying it as a trait (Chapter 2.5.3) and infer hypotheses on an interaction between psychological socio-spatial distance of climate change and global identity (Chapter 0). In Chapter 2.6, I outline my research approach for examining global identity in the context of climate change communication.

After outlining the background of my research, I provide an overview of the conducted studies (Chapter 3), before describing Study 1 (Chapter 4), Study 2 (Chapter 5), and Study 3 (Chapter 6) in detail. Finally, I discuss the results (Chapter 7) and formulate conclusions (Chapter 8).

2. Background

2.1 Sustainability communication

The concept of sustainability communication only recently appeared in scientific and public discourse. Godemann and Michelsen (2011b) edited a handbook summarising theoretical and empirical approaches. In their introduction, they outline the history of the concept and describe how "the development of the term sustainability communication is accompanied by the call for responsible human interaction with the natural and social environment" (p.3). This call became prominent in the last third of the twentieth century. Two publications were particularly influential. The report 'The limits to growth' by Meadows, Meadows, Randers, and Behrens (1972) raised global awareness of growing environmental problems and resource losses. The so-called Brundtland Report 'Our common future' by the World Commission on Environment and Development (WCED, 1987), founded by the United Nations (UN), formulated sustainable development as a societal goal. Here, *sustainable development* was defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (p. 43). This general definition is still the most widely accepted and cited. At the United Nations Conference on Environment and Development in Rio de Janeiro in 1992, sustainable development was put on the political action plan 'Agenda 21', which was signed by 172 states and outlined measures to be executed in the 21st century at the local, national, and international levels. Since then, sustainable development has been promoted by governments, non-governmental organisations, and businesses as a normative concept. It consists of an ethically motivated vision of a worldwide economy and way of life that secures quality of life in a healthy natural and social environment in light of limited resources. However, several interpretations and uses of the concept exist, with varying emphases on core elements such as the values of intergenerational and international justice and responsibility, freedom and self-determination, participation, and living a modest life. A further historical milestone was the formulation of the eight 'Millennium Developmental Goals' in 2000, one of which was ecological sustainability, by the UN, World Bank, Organisation for Economic Cooperation and Development (OECD), and several non-governmental organisations. In 2002, the World Summit on Sustainable Development was held in Johannesburg, releasing the 'Johannesburg Declaration on Sustainable Development'. Finally, the 'Agenda 2030' with 17 Sustainable Development Goals was passed in 2015 (for a detailed historical overview, see Pufé, 2017).

Sustainability is the aspired outcome of the sustainable development process (Otto, 2007, p. 39). It can be generally defined as the use of a system in a way that allows the system to endure in its core characteristics (Pufé, 2017, p. 28). The term was originally applied to forestry and referred to the use of wood in a regenerative way that allows the forest to recover and keep its stock. Today, it is applied to the societal system as a whole and is often described as consisting of the three overlapping and interacting elements of ecological, economic, and social sustainability. Each of these elements is associated with specific challenges societies are facing and strategies to meet these challenges.

Ecological sustainability refers to an enduring healthy environment as the basis for human health and livelihood. Important ecological challenges include, for example, climate change, the loss of biodiversity and resources, and pollution. Strategies to meet these challenges aim to reduce the human ecological footprint with ideas such as renewable energy innovations or resource and waste reduction measures. *Economic sustainability* entails securing societal production conditions. Economic challenges include, for example, structural change and competition due to globalisation and the goal of unlimited economic growth in light of limited resources. Sustainability strategies aim to secure economic prosperity within these resource limits with ideas such as sustainable production and consumption processes, a post-growth economy, or an economy for the common good. *Social sustainability* consists of enduring inter- and intragenerational social justice. Examples of major social challenges are population growth and migration, inequality between rich and poor, and a lack of food security, education and health. Sustainability strategies aim to secure human rights, cultural diversity, well-being, and a work-life balance with ideas such as education for sustainable development, fair trade concepts, and intercultural dialogue (OECD, 2000; Pufé, 2017).

The strategies for meeting challenges to sustainable development can be classified under three complementary guiding principles (Otto, 2007). *Efficiency* strategies aim at increased resource productivity (e.g., energy efficient products). *Consistency* strategies aim at resource use that mirrors natural cycles and does not negatively impact the natural system (e.g., cradle-to-cradle products; Braungart, McDonough, & Bollinger, 2007). *Sufficiency* strategies aim at reduced resource use (e.g., reused or shared products). While the implementation of these strategies largely takes place at the level of governments and institutions, individual behaviour also plays a crucial role for their success (Otto, 2007).

The outlined challenges have given rise to numerous scientific efforts to understand their origins, progression, and possible solutions. Godemann and Michelsen (2011a) argue that sustainability research implies a paradigm shift within science due to its problem-oriented and interdisciplinary approach that considers the interests of social, economic, and political actors as constitutive elements. Moreover, it is embedded in cultural contexts that can differ in their definitions of relevant values (e.g., justice or participation). This poses challenges to sustainability research and makes communication particularly important. Thus, *sustainability communication* can be defined as a process of communication and social understanding aimed at a vision of a sustainable future. It deals with associated values and norms, with the causes of unsustainable societal development, and with possible solutions. Its task lies in "introducing an understanding of the world, that is of the relationship between humans and their environment, into social discourse, developing a critical awareness of the problems about this relationship and then relating them to social values and norms" (p. 6). This communication can take place "between individuals, between individuals and institutions, between institutions and within institutions, in schools and universities, in the media, in politics, in business, in communities" (p. 6). My work concerns sustainability communication in the media.

Media research on sustainability communication has been conducted regarding diverse outlets, such as news media (e.g., Kolandai-Matchett, 2009), literature (e.g., Mobley, Vagias, & DeWard, 2010), films (e.g., Clemens & Hamakawa, 2010; Gutiérrez-Pérez, 2014; Pilgeram & Meeuf, 2014), or virtual environments (e.g., Ahn, Fox, Dale, & Avant, 2015). Classic information campaigns (e.g., Kolandai-Matchett, 2009) as well as newer approaches like entertainment education programs (e.g., Reinermann, Lubjuhn, Bouman, & Singhal, 2014) and narratives (e.g., Rhodes, Toole, & Arpan, 2016) have been investigated. My focus lies on classic communication in news media as a central channel informing public discourse.

Sustainability communication does not have its own theoretical frameworks, but makes use of theories primarily from communication, sociology, and psychology. As an ethical concept, it is also grounded in philosophy (Ott, Muraca, & Baatz, 2011). Empirically, it is strongly informed by interdisciplinary research on environmental, risk, and science communication (Adomßent & Godemann, 2011). It goes beyond its origin in environmental communication by integrating the environmental, economic, and social dimensions of the sustainability concept. Two types of sustainability communication can be distinguished. On the one hand, there is communication *about* a specific topic (e.g., climate change), which involves a transdisciplinary discourse in order to facilitate understanding of a problem and discuss possible solutions; on the other hand, there is communication *of* a specific topic in order to achieve related effects (e.g., climate protection; Godemann & Michelsen, 2011a). My work mostly concerns the latter. In this regard, research on sustainability communication is inherently normative and can be regarded as research on strategic communication because it accepts sustainability as an important societal goal. Hence, on a broad level, my research seeks to support the development of a sustainable society by examining how communication can convey knowledge and motivate individual behaviours to bring us further along that path.

I study climate change communication as an example of sustainability communication for three reasons. First, many scientists regard climate change as a uniquely important and urgent societal problem that intensifies other major challenges to sustainable development, such as resource loss or migration (Ripple et al., 2017). With my research, I aim to contribute to understanding how communicating the issue might motivate engagement to limit climate change. Second, "anthropogenic climate change constitutes a paradigmatic sustainability problem" (Newig, 2011, p. 119). Hence, other challenges to sustainable development and associated communication strategies can be meaningfully informed by research on climate change. As a consequence, even though my research examines the communication of a specific topic, it is likely to be societally useful and informative with regard to other challenges to sustainable development as well. Third, climate change communication is a "particular and fast-developing aspect of sustainability communication" (p. 121) and my own research can thus build on existing knowledge and contribute to this discourse.

2.2 Climate change communication

One of the most important publications to raise public attention concerning climate change was the 'Assessment Report' released by the *Intergovernmental Panel on Climate Change* (IPCC). This institution was founded by the United Nations Environment Program and the World Meteorological Organization in 1988. Its task is to provide a summary of current scientific knowledge on anthropogenic (i.e., human-induced) climate change, its origins and projected impacts as well as options for mitigation (i.e., measures to limit climate change) and adaptation (i.e., measures to reduce vulnerability to climatic changes). The IPCC does not conduct research itself. Rather, a large number of scientists and other experts contribute to its work by reviewing existing publications in the field. These research summaries are then reviewed and approved by typically more than 120 UN-associated governments (IPCC, 2010). The first Assessment Report was released in 1990, the fifth and most recent in 2014 (IPCC, 2014). The report consists of three parts. Part I summarises the physical science basis for observed climatic changes and their causes. Part II describes the impacts of climate change on people and the environment as well as their vulnerabilities and adaptation opportunities. Part III suggests mitigation strategies. The 'Synthesis Report' is a final summary of all three working group reports. A shortened summary for policymakers, aiming to communicate the complex scientific evidence in comprehensible language, is also provided. The reports are used as a basis for international negotiations such as the UN climate summits.

Prognoses in the IPCC report are based on six different models of future greenhouse gas emission scenarios ranging from an immediate end to all anthropogenic emissions to a further unimpeded rise in emissions. A specific characteristic of the IPCC reports is that they aim to transparently communicate the uncertainty of the findings and prognoses, which is inherent in science, by providing a confidence scale. How to best determine and communicate uncertainties and confidence is an ongoing debate, as these concepts may be difficult for readers to interpret and lead to confusion or misinterpretation (e.g., Adler & Hirsch Hadorn, 2014; Bailey, Giangola, & Boykoff, 2014; Budescu, Broomell, & Por, 2009; Maurer, 2011; Schenk & Lensink, 2007). The IPCC and the vast majority of climate scientists advance the view that the likelihood of dramatic consequences of climate change for life on earth is high enough to justify societal changes to mitigate climate change (Maibach et al., 2014).

The main results of the fifth assessment report are as follows (with confidence ratings ranging from likely to virtually certain): It is unequivocal that the climate system is warming. Many of the changes that have been observed since the 1950s are unprecedented over decades or even millennia. The temperature of the atmosphere and oceans has increased, ice and snow have diminished, and there has been a rise in sea levels and in the concentration of greenhouse gases (carbon dioxide (CO_2), methane, nitrous oxide). CO_2 is the largest driver of climate change. It is clear that humans influence the climate system (i.e., anthropogenic climate change) and extremely likely that this influence has been the major cause of global warming since the middle of the 20th century. If greenhouse gas emissions continue, further warming and changes in the climate system will occur, raising the likelihood of pervasive, severe, and irreversible consequences for ecosystems and people. Climate change is expected to amplify existing risks and create new ones, which will be unevenly distributed and greater for disadvantaged peoples. Examples are more extreme and more frequent weather conditions in wet and dry regions (e.g., extreme precipitation and heat waves), an increase in extremely high sea levels, a loss of land, acidification of the ocean, and severe impairments to food production. In order to limit climate change, emissions need to be substantially reduced. Such mitigation measures together with adaptation measures can limit the risks arising from climate change and contribute to sustainable development. They involve sustainable technologies and infrastructure, livelihoods, as well as behavioural and lifestyle choices (IPCC, 2014).

A further publication that raised public awareness was the 'Stern Review Report on the Economics of Climate Change' by the World Bank economist Nicolas Stern (2006), which was commissioned by the British government. He estimated that humanity would face costs of 5.5 trillion Euros per year until 2100 if climate protection measures failed (Pufé, 2017). The results of these publications have been communicated to the public mainly through mass media (Brüggemann et al., 2018). It is difficult for people to receive information apart from media coverage as direct contact to climate scientists or politicians is rare.

Climate change communication, as a specific subfield of sustainability communication, is a growing research and policy field (for overviews, see Corner & Clarke, 2017; Moser, 2010; Moser & Dilling, 2007; Nerlich, Koteyko, & Brown, 2010; Neverla & Schäfer, 2012; Whitmarsh, O'Neill, & Lorenzoni, 2011). Moser (2010) describes its history. Early communication tended to focus on scientific publications and synthesis reports such as the IPCC Assessment Report, as well as occasionally on severe extreme events associated with climate change or prestigious conferences and policy meetings. As the implications of climate change became increasingly recognised as potentially pervasive threats for the planet, the call to reduce greenhouse gas emissions and carbon-emitting economic sectors grew louder. At the same time, spokespersons for a carbon-heavy economy created "an impression of inadequate scientific understanding, continuing lack of scientific consensus, and legitimate alternative explanations for the growing evidence of global warming" (p. 32). Even though climate-sceptical voices were the minority, "mass media outlets—bound by a long-standing 'balancing' norm—reported on, and helped construct and magnify, the resulting climate change discourse as a 'battle' over unproven science" (Moser, 2010, p.32; see e.g., Boykoff & Boykoff, 2004; Ding, Maibach, Zhao, Roser-Renouf, & Leiserowitz, 2011). However, scientific consensus continued to increase (Anderegg, Prall, Harold, & Schneider, 2010; Cook et al., 2014; Doran & Zimmerman, 2009; Oreskes, 2004), and today it is estimated that "97% or more of climate scientists are convinced that human-caused climate change is happening" (Maibach et al., 2014, p. 295).

Alongside the rise in scientific consensus, the urgency of implementing climate protective measures has been increasingly expressed by policy-makers and in public discourse. As a consequence, climate change communication has expanded to include top-down campaigns by regional, national, or supranational institutions in many countries. Moreover, research on climate change communication itself emerged. Initially, contributions did not stem from researchers in the well-established field of communication science, but rather from those directly involved in communicating the issue. Nowadays, however, climate change communication is increasingly being examined by communication scholars (Moser, 2010).

The task of communicating climate change is similar to communicating other risk issues and can profit from corresponding scientific knowledge. However, several characteristics make climate change a specifically tough issue to engage people with (Moser, 2010). First, the primary causes, greenhouse gases, are invisible. Second, the causes and effects are often distant in time and space. Third, modern humans tend to be insulated from their environment and therefore lack experiences of climatic extremes and variability. Fourth, the beneficial effects of climate protective action are delayed and unlikely to be experienced by the individuals taking them today. Fifth, people are sceptical about humanity's capacity to cause global systemic change and effectively implement solutions. Sixth, climate change is a complex issue that is never entirely predictable and thus necessarily associated with some degree of uncertainty. Seventh, policy makers do not send consistent signals indicating a need to move towards a climate protective society. Eighth, self-interests such as the comforts of a carbon-intensive lifestyle can outweigh considerations of justice and common goods. The fact that climate change is such a challenging issue makes communication about it challenging as well. At the same time, communication is a key strategy for dealing with climate change because societal debate needs to be informed and receive a platform in order to unfold (Newig, 2011).

2.2.1 Climate change in the news

In my research, I focus on *climate change communication in classic news reporting*, because the news is still the central means of such communication (Brüggemann et al., 2018; Schmidt, Ivanova, & Schäfer, 2013). Schmidt et al. (2013) analysed issue attention in leading news media in 27 countries between 1996 and 2010. Climate change received more media attention compared to other topics and became more important over the time period analysed. In carbon-dependent countries such as Germany that have made a political commitment to reduce their greenhouse gas emissions under the Kyoto Protocol, media attention is particularly high. Peaks in media attention can be observed when IPCC reports are released or UN climate summits are held. These events are portrayed in news coverage as current political issues, but also used as an occasion to convey background knowledge about the causes and consequences of climate change. Therefore, the news becomes a particularly important outlet for science communication about climate change around the time of these events (Arlt & Wolling, 2012). My research interest lies in news that communicates scientific findings, such as the results of the IPCC report (IPCC, 2014), and aims to convey knowledge and motivate behaviour change in favour of climate protection. Hence, such news can be classified as science communication on the one hand, and strategic communication on the other.

News media are "crucial for the societal uptake of climate change and climate change politics [. . . as] central agents for raising awareness and disseminating information" (Schmidt et al., 2013, p. 1233). For example, Zhao (2009) found that the more people generally used newspapers and the Internet, the more knowledgeable they considered themselves to be about climate change. News media seem to be an important source of information people use to understand the issue (Ryghaug, Holtan Sørensen, & Næss, 2011; Stamm, Clark, & Eblacas, 2000). In a study by Kahlor and Rosenthal (2009), subjectively perceived understanding of climate change information received in the mass media was related to how complex and accurately people could define the term global warming.

Because climate change is not a niche topic, in addition to actively searching for information on climate change, recipients can also come into contact with the issue as part of their habitual media use (Arlt, Hoppe, & Wolling, 2010; Oschatz, 2018). Large proportions of the population use news media. For example, a representative study of the German population in 2016 showed that 56% watched public TV news on a daily basis, 19% at least once a week, and 7% several times a month; 47% listened to public radio news on a daily basis, 12 % at least once a week, and 4% several times a month; 45% read or watched online news on a daily basis, 18% at least once a week, and 3% several times a month; 45% read daily newspapers on a daily basis, 15% at least once a week, and 4% several times a month (van Eimeren & Egger, 2016). Among these news outlets, online news media in particular are on the rise, and online news audiences are continually growing. While 25% of the German population used online news on a daily basis and 18% on a weekly basis in 2015 (van Eimeren & Koch, 2016), the shares had already risen to 45% and 18% respectively in 2016 (van Eimeren & Egger, 2016). Important reasons for engaging with news media include knowing what is happening in the world and in one's own country as well as forming an opinion on political topics (van Eimeren & Egger, 2016). This makes news media a specifically useful channel for climate change communication.

Hence, the guiding research question of my work was: How can news about climate change be communicated in order to reach its audience, convey scientific knowledge, and motivate public engagement for climate protection? Before concretising my research interest, I will provide a brief impression of the diversity of research on climate change communication and locate my own research interest therein.

2.2.2 Research on climate change communication

Alongside growing political and societal discourse on the challenges of climate change, research on climate change communication has risen in recent years. For example, in a meta-analysis of research on the media coverage of climate change, Schäfer and Schlichting (2014) found that the first papers were published in the early 1990s and their number rose considerably from 2008 onwards.

Research in the field of climate change communication has examined media representations of climate change (for overviews, see Oschatz, 2018; Schäfer & Schlichting, 2014) and compared media outlets on this dimension. Classical news media are the main focus, but recently alternative media or new online media have been increasingly analysed. For example, Sharman (2014) examined the climate change-related blogosphere, finding that it serves as a platform for sceptical voices towards climate science. Anderson and Huntington (2017) analysed the language in Twitter discussions of climate change, finding that sarcasm and incivility were low overall. Trexler and Johns-Putra (2011) analysed representations of climate change in literature, with a specific focus on how the complexity of the issue is dealt with. Painter, Kristiansen, and Schäfer (2018) compared how the climate summit in Paris was portrayed in legacy media compared to new digital media (i.e., BuzzFeed, Huffington Post, and Vice). They found, for example, that Vice reported more on civil protests accompanying the negotiations, probably in order to appeal to its younger audience.

Furthermore, concrete examples of widely-disseminated climate change communication have been examined: for instance, publications such as the IPCC report (Schenk & Lensink, 2007) and campaigns such as the prominent one spearheaded by Al Gore (Nisbet & Kotcher, 2009). Various actors in media discourse, such as journalists (Brüggemann & Engesser, 2014; McIlwaine, 2013) and the relation between climate scientists and the media (Ivanova, Schäfer, Schlichting, & Schmidt, 2013; Lewandowsky, Oreskes, Risbey, Newell, & Smithson, 2015; Post, 2016), have also been discussed.

A further strand of research has investigated the relation between using various communication channels and media outlets and recipients' climate change-associated cognitions, emotions, and behaviours (for an overview of early studies, see Neverla & Taddicken, 2012). Most studies have examined the use of news media (e.g., Happer & Philo, 2016; Hart, Nisbet, & Myers, 2015; Oschatz, 2018) or films (e.g., Balmford et al., 2004; Greitemeyer, 2013; Howell, 2011, 2014; Leiserowitz, 2004; Lin, 2013; Löfgren & Nordblom, 2009; Lowe et al., 2006; for an overview, see Sakellari, 2015), but also less common formats such as stage plays (e.g., Bore & Reid, 2014). Rising interest in examining online communication outlets (for overviews, see Koteyko, Nerlich, & Hellsten, 2015; Schäfer, 2012) such as blogs (e.g., Matthews, 2015) and social media (e.g., facebook; Vraga, Anderson, Kotcher, & Maibach, 2015) can also be observed.

Moreover, the effects of specific features of communication have been investigated. Examples include the role and design of imagery (Braasch, 2013; O'Neill & Hulme, 2009; O'Neill & Smith, 2014), featured celebrities (Anderson, 2011), and wording (e.g., climate change vs. global warming, Schuldt, Konrath, & Schwarz, 2011; Villar & Krosnick, 2011; numeracy, Hart, 2013; grammar, Bailey et al., 2014; fear appeals, O'Neill & Nicholson-Cole, 2009; Stern, 2012; persuasive vs. informative messages, Rabinovich, Morton, & Birney, 2012).

A further research focus that draws upon the results of media effects research concerns the development of communication strategies to engage the public with respect to climate change and support climate protection. Such strategies include general approaches to communicate the issue to broad audiences as well as tailored messages that target specific audiences rather than one-fits-all approaches (for overviews, see Bostrom, Böhm, & O'Connor, 2013; Hine et al., 2014). Examples include the tailoring of messages with respect to individuals' values (Corner, Markowitz, & Pidgeon, 2014), goals (Unsworth & McNeill, 2017), or phases of behaviour change (Bamberg, 2013; Nachreiner, Mack, Matthies, & Tampe-Mai, 2015). As my research concerns communication strategies, in the following sections, I outline selected approaches that have been suggested in order to provide an impression of this research field, before locating and defining my own research interest therein.

2.2.3 Communication strategies to increase public engagement with climate change

Several communication strategies to engage the public with respect to climate change have been proposed by scholars from different disciplines, including psychology, communication, and education. In this section, I describe five general recommendations to promote public engagement that were recently formulated by van der Linden et al. (2015). These recommendations (as well as others) can be found in several publications outlining policy advice for climate change communication (see e.g., Corner & Clarke, 2017; Leiserowitz, 2007; Markowitz & Shariff, 2012; Nisbet, 2009; Patt & Weber, 2014; Wibeck, 2014). The proposed strategies are based on general psychological reasoning and concrete empirical findings on climate change-related cognitions, emotions, and behaviours. I regard these general suggestions as promising. Practically useful communication strategies can be inferred from them. However, as the research field is young, I believe that they still need further empirical evidence, specifically with regard to direct applications for externally valid communication contexts such as news reporting.

First, van der Linden et al. (2015) suggest to *refer to people's personal experiences*. The psychological argument is that people might have felt threats that are likely to become more severe in the future due to climate change (e.g., flooding, hurricanes, or heat waves). Associating their past experiences with the phenomenon of climate change might motivate engagement in climate protection. In support of this notion, Spence, Poortinga, Butler, and Pidgeon (2011) found that people who recently experienced flooding in their local area were more concerned about climate change, believed to a greater degree that they could help reduce climate change, and perceived their local area as more vulnerable, which in turn predicted their preparedness to reduce energy consumption in order to tackle climate change (for a review of the relation between personal experiences of weather and/or events related to climate change and climate change-related cognitions and behavioural intentions, see McDonald et al., 2015). Hence, a communication strategy derived from this reasoning would be to associate severe weather events with climate change in news reporting.

The second recommendation consists of *activating social group norms and promoting a sense of group efficacy*. Individuals only have a small direct influence on climate change, and the goal of climate protection can only be achieved through collective efforts (Koletsou & Mancy, 2011). Communicating descriptive norms about climate protective behaviours that are implemented by the majority of people in a social context that is relevant to individuals can motivate them to adjust their own behaviour to the group norm (Nolan, Schultz, Cialdini, Goldstein, & Griskevicius, 2008). In addition to group norms, collective efficacy (i.e., the belief that a task can be solved as a group, Bandura, 2000) is thought to predict climate protective behaviour (e.g., Roser-Renouf, Maibach, Leiserowitz, & Zhao, 2014). For example, Jugert et al. (2016) found that communicating successful group efforts to establish an environmentally friendly mobility culture increased people's perceived collective efficacy that societal change towards sustainable mobility can be achieved. Moreover, the higher people's perceived collective efficacy, the more they felt individually capable of contributing to this change (i.e., self-efficacy). This in turn predicted how much they intended to use sustainable transport options in the future. Hence, a communication strategy inferred from this reasoning would be to disseminate positive examples of group climate protection initiatives (e.g., initiatives promoting cycling in cities).

The third recommended strategy is to *emphasise gains instead of losses*. On the one hand, this could imply communicating positive consequences of undertaking climate mitigation (i.e., a positive vision of the future if we meet the challenge of climate change) rather than negative consequences of refraining from climate mitigation (i.e., a negative vision of the future if we fail to meet the challenge). For example, Spence and Pidgeon (2010) found in an experiment that emphasising positive gains of climate mitigation measures led to more positive attitudes towards these measures than emphasising negative losses of not undertaking them. On the other hand, emphasising gains could also imply changing the perception that climate protection requires abandoning comfort. For example, in an experiment by Gifford and Comeau (2011), people were confronted either with statements that portrayed climate protection measures as personal and societal gains or as sacrifices. Communicating climate protection as gains lead to higher perceived competence among participants to engage in behaviours that reduce greenhouse gas emissions and higher intentions to actually engage in them. In their reflection on communication strategies, Corner and Clarke (2017) also come to the conclusion that "while there is nothing to be gained by downplaying the seriousness or urgency of climate change, talking about the many ways in which climate policies will benefit society makes a lot of sense" (p. 57; for further examples of ways to communicate gains and their effects, see Bain et al., 2015; Bertolotti & Catellani, 2014; Morton, Rabinovich, Marshall, & Bretschneider, 2011). Drawing upon this strand of research, news could focus more on the positive gains of climate protection for recipients.

Fourth, van der Linden et al. (2015) argue that communication should *appeal to intrinsic rather than extrinsic motives* and caution against deploying external incentives such as monetary gains to promote climate protective behavioural changes as the only means of motivating people (e.g., Bolderdijk, Steg, Geller, Lehman, & Postmes, 2012). Doing something out of intrinsic motivation means doing it for its own sake "without the necessity of separable consequences" (Deci & Ryan, 2000, p. 233). For example, Steinhorst, Klöckner, and Matthies (2015) examined the communication of electricity-saving tips combined with the saving potential in CO_2 versus money. They found that both forms of communication increased intentions to save electricity compared to a control group that received no electricity-saving tips. However, only people who had received information on the CO_2 saving potential also exhibited higher intentions to pursue other climate-friendly behaviours beyond electricity savings (i.e., a so-called spillover effect, which is a desirable outcome of climate change communication efforts). Furthermore, Steinhorst and Klöckner (2017) found that receiving electricity-saving tips combined with the CO_2 saving potential increased proenvironmental intrinsic motivation, while information on monetary savings did not. A communication strategy inferred from this research would be to articulate reasons for climate protection per se in addition to possible external gains. In other words, climate protection should make sense for individuals in and of itself.

My own research concerns the fifth recommended strategy. Here, van der Linden et al. (2015) suggest drawing people's attention to local instead of global or distant consequences of climate change. This strategy has been termed *proximising climate change* (Brügger et al., 2016). In order to examine this communication strategy in a practically relevant context, I specifically aimed to investigate proximising climate change in news coverage. Hence, my research examined the following question: Is proximising climate change a useful communication strategy to communicate climate change in the news? This strategy is described in the following section.

2.3 Proximising climate change as a communication strategy

Climate change is a global issue and often communicated as such. For example, in Germany, the consequences of climate change tend to be portrayed on a global scale rather than as regional issues in news reporting (Arlt & Wolling, 2012). The communication strategy of *proximising* climate change consists of focussing on local instead of global or spatially distant consequences. Proximising can also include a focus on current instead of future consequences (Brügger et al., 2016; van der Linden et al., 2015). However, in my work I focus on the spatial component of this strategy, which has also been termed *localising* climate change (Brügger, Morton, & Dessai, 2015; Shome & Marx, 2009).

The idea behind this recommendation is that communicating spatial proximity might change the common perception of climate change as a phenomenon that mainly impacts other people in remote places. If climate change is perceived as affecting the local area and people living close by, it might be considered more relevant (Scannell & Gifford, 2013). This argument is theoretically embedded in the construal level theory of psychological distance (Trope & Liberman, 2010). In the following subsections, I describe the theory's basic assumptions (Chapter 2.3.1) and how it has been related to climate change (Chapter 2.3.2). The aim of these two sections is to provide a historical account of how and why climate change was linked to construal level theory. After explaining this general theoretical background, I will analyse the concrete theoretical assumptions that underlie the communication strategy of proximising climate change (Chapter 2.3.3). Moreover, I will draw a connection to media effects theories within which the strategy can be located (Chapter 2.3.4). Finally, I summarise the empirical evidence on the effects of proximising climate change (Chapter 2.3.5).

2.3.1 Construal level theory of psychological distance

In order to understand individuals' relation to global climate change, psychologists (Milfont, 2010; Spence et al., 2012) have recently described it in terms of Trope and Liberman's *construal level theory of psychological distance* (CLT, Liberman & Trope, 2008; Trope & Liberman, 2010). This theory concerns the basic observation that our mind does not constantly stay where our body is located. Rather, humans think about proximal as well as distant objects, events, situations, and people. We have the capability to consider our immediate surroundings and imagine remote, even unknown places. We can introspect about our own experiences and take the perspective of other people. We are able to reflect about the current moment, memories of the past, and fears or hopes for the future. We can evaluate certain facts and envision hypothetical scenarios or alternative realities. *Psychological distance* is defined as "a subjective experience that something is close or far away from the self, here, and now. Psychological distance is thus egocentric: Its reference point is the self, here, and now" (Trope & Liberman, 2010, p. 440). CLT refers to the psychological distance of objects and events alike. In the context of this work, the psychological distance of events is central. CLT describes this psychological distance as occurring on four dimensions: 1) *spatial distance* (i.e., the perception of *where* an event occurs – geographically close or far away), 2) *social distance* (i.e., the perception of *to whom* an event occurs – to me, known or similar others, or strangers), 3) *temporal distance* (i.e., the perception of *when* an event occurs – now or in the near or distant future), and 4) *hypothetical distance* or uncertainty (i.e., the perception of *whether* an event will occur – likely or unlikely).

The first main assumption of CLT is that these four dimensions are cognitively related to each other because they have the same egocentric reference point. "Remote locations should bring to mind the distant rather than near future, other people rather than oneself, and unlikely rather than likely events" (Trope & Liberman, 2010, p. 442). The assumption of a cognitive relation between the dimensions has been supported, for example, by experimental research that varied the distance of stimuli on one dimension and found effects on participants' psychological distance regarding the other dimensions (e.g., Stephan, Liberman, & Trope, 2011; Wakslak, 2012; for overviews, see Henderson, Wakslak, Fujita, & Rohrbach, 2011; Trope & Liberman, 2010).

The second main assumption of CLT is that the psychological distance of phenomena is linked to their mental representation and vice versa. These representations are called construals. Low psychological distance is associated with *lower-level construals*, which are described as "concrete, relatively unstructured, and contextualized representations that include subordinate and incidental features" (Liberman & Trope, 2008, p. 1201). For example, thinking about a temporally proximal summer holiday starting next week will tend to raise thoughts about concrete features of the hotel that has been booked or the beach that will be visited, the temperature outside, the concrete people who will be in the bar at night, and the activities that could be planned, such as surfing at the local surf school. Another characteristic of lower-level construals is that psychologically proximal events tend to be represented in *how* terms. For example, they will evoke thoughts about how to get to the holiday destination or what concrete luggage to bring.

High psychological distance is associated with *higher-level construals*, which are described as abstract, schematic, and decontextualised representations that extract superordinate and central features. They are not necessarily impoverished, but can contain additional information regarding aspects such as value or valence. For example, thinking about a temporally distant summer holiday starting next year will raise more general and abstract thoughts about having fun, socialising with people, and relaxing (i.e., the positive valence which is central to the aspired activities such as surfing or visiting a bar), without imagining the concrete context or situation in which activities with these higher-order features can be realised. Psychologically distant events tend to be represented in *why* terms. For example, they will evoke thoughts about why the journey is being pursued (e.g., fulfiling personal needs for relaxation or adventure) and whether the general destination suits these personal needs.

The assumption of a relation between psychological distance and construal level has been supported, for example, by implicit association tests in which participants associated congruent stimuli (i.e., high-level construal stimuli with psychologically distant stimuli and low-level construal stimuli with psychologically proximal stimuli) with one another faster than incongruent stimuli (i.e., high-level construal stimuli with psychologically proximal stimuli and low-level construal stimuli with psychologically distant stimuli; Bar-Anan, Liberman, & Trope, 2006). Moreover, manipulating the construal level has been found to affect psychological distance and vice versa (for an overview, see Trope & Liberman, 2010). The authors thus suggest that "the different levels of construal serve to expand and contract one's mental horizon and thus mentally traverse psychological distance" (Trope & Liberman, 2010, p. 442).

The third main assumption of CLT is that psychological distance can impact people's cognitions, emotions, and behaviours via or in interaction with these mental construals. On the one hand, a mediating process is assumed (i.e., psychological distance influences construal level, which in turn influences cognitions, emotions, and behaviours). For example, in their review, Trope and Liberman (2010) state that "as psychological distance increases, construals would become more abstract, and as level of abstraction increases, so too would the psychological distance people envisage. [. . .] The different distances should also similarly influence prediction, evaluation, and action, inasmuch as these outcomes are mediated by construal" (p. 440).

On the other hand, a moderated process is also outlined (i.e., psychological distance influences cognitions, emotions, and behaviours in interaction with or depending on construal level and vice versa). Trope and Liberman (2010) propose that psychological distance increases the impact of high-level information and decreases the impact of low-level information on prediction. Moreover, they assume that central, goal-related features (i.e., high-level construals) are more important when evaluating distant outcomes, whereas peripheral, goal-irrelevant features (i.e., low-level construals) are more important when evaluating proximal outcomes. Similarly, they assume that behaviour should be guided by central, value-consistent concerns (i.e., high-level construals) when outcomes are distant and by secondary, specific concerns (i.e., low-level construals) when outcomes are proximal.

Three illustrative studies provide an impression of how CLT is empirically investigated. In an example of studying the effects of objective spatial proximity vs. distance on predictions, N = 58 students in New York viewed graphs showing global trends either in a spatially proximal location (New York) or distant location (Florence, Italy) over the six past years, with a recent deviation (Henderson, Fujita, Trope, and Liberman, 2006, Study 4). They were asked to estimate whether the next year would resemble the general trend (high-level information) or the recent deviation (low-level information). Participants in the distance condition were less likely to base their prediction on the recent deviation than participants in the proximal condition. They were also more likely to base their prediction on the general trend than on the recent deviation, while participants in the proximal condition exhibited no difference. These results imply that spatial distance to events leads people to include high-level considerations in their thinking about the events. With regard to my research interest, this could imply that considering distant events associated with climate change might lead people to think about these events more in terms of high-level construals (e.g., abstract features, why terms, value-consistent concerns), while considering proximal events might lead them to think about them more in terms of low-level construals (e.g., concrete features, how terms, specific concerns).

Williams, Stein, and Galguera (2014, Study 1d) investigated the effects of objective temporal proximity vs. distance and construal level on emotions and behaviour in a sample of N = 208 online respondents on Amazon's Mechanical Turk. They manipulated construal level by asking participants either how (low-level construal) or why (high-level construal) they would donate to charity. Then, they presented an appeal for the Red Cross either focussing on potential hurricane victims in the upcoming 2013 season (temporal proximity) or the 2023 season (temporal distance). Participants in the proximity condition donated more of their compensation to the Red Cross than participants in the distance condition. Moreover, participants donated more when they thought about charity in abstract why terms than concrete how terms. Distance and construal level conditions did not interact in this study. Analysing indirect relations via emotional variables, they found that temporal proximity positively predicted donation behaviour through a higher emotional connection with the victims, while abstract construal positively predicted donation behaviour through making the idea of donating appear more pleasant. With regard to my research interest, the result that the proximity of an event (here, temporal proximity) can increase action (here, prosocial behaviour) is of particular interest as it supports the supposition that the proximity of climate change-related events might indeed result in climate protective action tendencies.

Bashir, Wilson, Lockwood, Chasteen, and Alisat (2014) examined the effects of the subjective temporal proximity vs. distance (i.e., psychological temporal distance) of climate change consequences on climate protective action tendencies. In Study 1, N = 65 undergraduate students in Canada were asked to place a dot representing the year 2020 on a timeline ranging either from the present to 2085 (relative temporal proximity of 2020) or from the present to 2025 (relative temporal distance of 2020). They then read about climate change consequences that could occur in 2020. A manipulation check showed that the year 2020 felt closer to participants in the proximity condition, indicating that the psychological temporal distance of the year 2020 declined. Moreover, they expressed stronger proenvironmental behavioural intentions, as assessed by a 17-item scale, compared to participants in the distance condition. In Study 2, N = 182 undergraduate students first reported their past proenvironmental behaviour on an adapted 17-item scale. Then, parallel to Study 1, they were asked to place a dot representing the year 2025 on a timeline ranging either from the present to 2090 (relative temporal proximity of 2025) or from the present to 2030 (relative temporal distance of 2025). Subsequently, they read about climate change consequences that could occur in 2025 and rated the possibility of mitigating climate change by pursuing five concrete goals, such as purchasing choices, and five abstract goals, such as protecting the planet. Again, the manipulation check showed that the year 2025 felt closer to participants in the proximity condition. Moreover, after controlling for past proenvironmental behaviour in an analysis of covariance, the authors found that participants in the proximity condition reported more proenvironmental behaviour on the 17 items in a follow-up measure one week after the laboratory session (n = 123). Psychological temporal proximity indirectly predicted proenvironmental behaviour through the extent to which participants construed climate change goals concretely (although it is not clear to me how exactly this measure was built from the items). With regard to my research interest, the result that psychological proximity of the time when climate change consequences are described as occurring increased climate-friendly behavioural intentions and behaviour supports the supposition that psychological spatial proximity might have a similarly positive impact.

Building upon this first example of an application of CLT in research on climate change, I will now outline in detail how and why the phenomenon of climate change has been related to CLT and the concept of psychological distance in the next section.

2.3.2 Psychological distance and climate change

The idea that people's relation to climate change might be informed by CLT was based on the notion that climate change and its associated events might be perceived as a psychologically distant phenomenon (Milfont, 2010). It was further argued that this psychological distance might be rooted in *actual* distance, specifically from a European or US perspective. I will focus here on the European perspective as this is the focus of my research.

The four subjective dimensions of psychological distance have been related to specific, relatively objective characteristics associated with climate change (Houghton et al., 2001; Lorenzoni & Pidgeon, 2006). First, from a European perspective, climate change's impact is predicted to be particularly strong in geographically remote locations (spatial distance).

Second and related to this, Europeans themselves are presumed to be less affected than others, specifically citizens of developing countries in the global South (social distance). Third, the effects of human behaviour on the climate are often not immediately perceptible, but the consequences will be felt for many generations to come (temporal distance). Finally, climate change is still discussed controversially and has a hypothetical character insofar as a lot of research and news coverage is based on scenarios communicating some degree of uncertainty (hypothetical distance). It has been argued that these four kinds of distance might be recognised by individuals and influence their perception of the climate change phenomenon (Spence et al., 2012). This argument was backed by quantitative as well as qualitative survey research, mostly conducted in Europe and the United States, assessing perceptions of climate change as a risk (for an overview, see Lorenzoni et al., 2007; Lorenzoni & Pidgeon, 2006).

Speaking in favour of the social distance of climate change, this research found that people evaluated the threats arising from climate change as higher for society on a general level than for them personally. For example, Zwick and Renn (2002) conducted interviews with N = 1,508 randomly sampled residents of Germany and found that 54% perceived climate change as a high social hazard, but only 21% perceived it as a high personal threat. Similarly, in a sample of N = 113 French adults, climate change was perceived as a greater risk for humanity as a whole than for inhabitants of one's country, town, and oneself (Fleury-Bahi, 2008).

The social and spatial distance of the climate change phenomenon could be inferred from a study with N = 1,225 randomly sampled adults in the United States (Bord, Fisher, & O'Connor, 1998). Here, expected threats to the standard of living, food security, and general health of "many people" in "much of the world" were rated more likely than corresponding threats to the respondents themselves and their local area. However, it must be noted that this study was conducted a long time ago. In a more recent study, Leiserowitz et al. (2010) found in interviews with N = 1,024 respondents in the United States that the harms of climate change were perceived as most likely for developing countries and decreasingly likely for other modern industrialised countries, the United States, the respondents' community, family, and them personally.

Schultz et al. (2014) report results on the spatial bias of six environmental problems, including global warming, assessed in a study with N = 3,277 students in 22 countries. The concept of spatial bias can be interpreted as psychological social and spatial distance.

They asked how serious participants evaluated the environmental problems in their community and worldwide on scales ranging from 1 to 4. They built two scores, one for global severity and one for local severity, and operationalised spatial bias as the difference between them. They found that on average, the severity of environmental problems was rated as higher worldwide than in the respondents' own community (mean difference of .77). In a follow-up study with N = 1,131 students in eight countries, the severity of environmental problems, including global warming, was again rated as higher on a global than a local level (mean difference of .85). Unfortunately, the authors do not differentiate between the specific problems, meaning that results for climate change only cannot be explicitly inferred.

Climate change is also often evaluated as a temporally distant threat (Lorenzoni et al., 2007; Lorenzoni & Pidgeon, 2006; Pahl et al., 2014). For example, in the study by Leiserowitz et al. (2010), American participants expected harms to be more likely for future generations.

Moreover, public scepticism and uncertainty about climate change's existence, or at least the strength of its expected impact, indicates the hypothetical distance of the phenomenon (Capstick & Pidgeon, 2014; Poortinga et al., 2011; Smith & Leiserowitz, 2012; Whitmarsh, 2011). In qualitative research, uncertainty and scepticism have been named as barriers to engagement with climate change (Lorenzoni et al., 2007).

Drawing upon indicators such as the outlined results of past research suggesting that climate change represents a psychologically distant phenomenon, Spence et al. (2012) were the first to empirically investigate climate change perceptions with an explicit reference to CLT. They assessed all four dimensions of psychological distance of climate change as well as their relations with concern about climate change and preparedness to reduce energy use in order to mitigate climate change. Their study comprised computer-assisted personal interviews with a quota sample of N = 1,822 residents of Great Britain.

Taking a closer look at the descriptive distribution of agreement (percentage who tended to agree or strongly agreed) vs. disagreement (percentage who tended to disagree or strongly disagreed) to their items, they found that climate change was not perceived as distant, as might have been expected from the aforementioned prior results. Nevertheless, interindividual differences in perceived distance on all four dimensions could be observed. In their sample, 52.6% agreed that climate change is likely to affect the respondent's local area, while 30% disagreed (psychological spatial proximity); 48.6% disagreed that it is more likely to affect areas that are far away, while 32.1% agreed (psychological spatial distance). While more respondents agreed (45.8%) than disagreed (36.1%) that climate change will mostly affect developing countries (psychological socio-spatial distance), more also agreed (44.6%) than disagreed (32.2%) that climate change is likely to have an impact on people like themselves (psychological social proximity). Participants perceived of climate change as rather close in time, with 41% indicating that Britain is already feeling its effects (psychological temporal proximity). Finally, the study authors asked four questions related to people's uncertainty regarding the climate change phenomenon (psychological hypothetical distance), out of which they built a scale representing psychological hypothetical distance. Respondents were least uncertain about the existence of climate change and the scientific consensus about it. However, 40% agreed that the seriousness of climate change is exaggerated, and 70% agreed that they were uncertain about the effects of climate change. Finally, a fifth item on psychological hypothetical proximity, which was not included in the scale, showed that a majority of 78% agreed that human activity contributes to climate change at least to some extent in contrast to being an entirely natural process.

Questions on psychological proximity were reverse-coded to reflect psychological distance. The indicators of psychological distance on the four dimensions explained 54% of the variance in climate change concern, which was assessed with three items. The less people perceived that climate change is likely to affect their local area (spatial distance) and people like themselves (social distance), the less they were concerned about it. Moreover, the less certain they were about the climate change phenomenon as assessed by the index of four items (hypothetical distance) and the less they thought that effects are already being felt now compared to never (temporal distance), the less they were concerned about it. However, the perception that climate change mostly affects far-away areas (spatial distance) and developing countries (socio-spatial distance) were not related to level of concern.

The indicators of psychological distance explained 18% of the variance in preparedness to reduce energy use. The less people perceived that climate change is likely to affect their local area and people like themselves, and the less they thought that effects are already being felt now compared to never, the less they were prepared to act. The perception that climate change mostly affects far-away areas and uncertainty about climate change did not predict preparedness to act. However, the more participants believed that climate change mostly affects developing countries, the more they were prepared to act. Taking concerns into account revealed that they strongly predicted preparedness to act; only perceived impact on people like oneself and the perception of a greater impact on developing countries remained significant predictors. Thus, the indicators for both perceived social proximity and socio-spatial distance explained variance in the preparedness to act.

The perception that climate change will have a stronger impact on developing countries was not related to the other indicators of psychological distance and therefore seemed to be a separate construct. All other indicators were positively correlated and the authors were able to form an internally consistent scale of psychological distance.

A second study connecting CLT and climate change was provided by Carmi and Kimhi (2015). They conducted a survey with N = 305 Israeli students on threat perceptions, among them the threat of climate change. They assessed the psychological distance of climate change with three items, namely to which degree global warming would affect them personally (reverse-coded as social distance), when global warming was expected to be realised (temporal distance), and how probable its realisation was (hypothetical distance). The index of psychological distance they built was negatively related to the perceived severity of global warming, assessed with one item (β = -.72); emotions aroused by environment-related behaviour, assessed with six items (β = -.42); and willingness to make six behavioural sacrifices for environmental protection (β = -.38).

Moreover, Sacchi, Riva, and Aceto (2016) referred to CLT in their study of climate change-related variables. In the paper-and-pencil-based Study 1 of their article, N = 80 Italian students and workers were provided with a 3-item measure of psychological distance. They rated whether climate change consequences are close in time (reverse-coded as temporal distance), close in space (reverse-coded as spatial distance), and likely to occur (reverse-coded as hypothetical distance). The built index was negatively related to their 10-item measure of environmental attitudes (B = -1.23; 7-point Likert scales were used). This relation, in turn, was moderated by individuals' cognitive style. The more holistic rather than analytic their thinking, as assessed by a 6-item scale, the weaker the relation. In the experimental online follow-up Study 2, N = 171 Italian students were given cognitive tasks designed to induce either a holistic or an analytic thinking style and then answered a questionnaire. Psychological distance was negatively related to proenvironmental attitudes (r = -.47; both measures equivalent to Study 1), a 10-item scale on one's sense of connection to the environment (r = -.42), and a 7-item scale regarding proenvironmental behavioural intentions (r = -.42). Thinking style moderated these effects. All three relations were weaker for participants in the holistic condition. However, the general negative relation between psychological distance and proenvironmental attitudes and behavioural intentions is the main result of interest here.

The three outlined studies show how CLT and the concept of psychological distance have been theoretically related to the climate change phenomenon and empirically investigated. In the following section, I will analyse in detail the implications and the reasoning inferred by these studies for the communication strategy of proximising climate change.

2.3.3 Assumed process behind proximising climate change

In recent years, several researchers have mentioned proximising climate change as a potentially effective communication strategy to promote public engagement (e.g., Leiserowitz, 2007; Sacchi et al., 2016; Scannell & Gifford, 2013; Shome & Marx, 2009; Spence et al., 2012). Proximity could be communicated regarding all four dimensions of psychological distance in the CLT model. For example, news coverage could communicate proximity by focussing on 1) current consequences or consequences expected shortly instead of consequences that are predicted for the distant future (temporal proximising), 2) in spatially close instead of remote locations (spatial proximising), 3) that are expected to affect the addressed audience instead of other people (social proximising), 4) and relatively certain and unequivocal rather than uncertain and controversial (hypothetical proximising).

The underlying reasoning is that *communicating* proximity might decrease the *psychological* distance of climate change. Based on their correlational evidence of an association between lower psychological distance of climate change and stronger concern, Spence et al. (2012) suggested: "Our findings clearly point to the utility of risk communication techniques designed to reduce psychological distance" (p. 957). However, as they also found that the more people perceived climate change as affecting mostly developing countries (i.e., socio-spatial distance), the more they were motivated to act, they further state: "Highlighting the potentially very serious distant impacts of climate change may also be useful in promoting sustainable behavior, even among those already concerned" (p. 957). Hence, they did not fully rely on proximising climate change as a communication strategy.

Based on their finding of a correlation between the psychological distance of climate change and proenvironmental attitudes, connectedness with the environment, and proenvironmental behavioural intentions, which was moderated by individuals' thinking style (holistic vs. analytic), Sacchi et al. (2016) concluded: "Our study suggests that the specific combination of an analytic mindset and a reduced psychological distance might be an effective strategy to increase people's connections with the environment, their attitudes toward environmentalism, and their ecological behavioral intentions. Although future research is needed to test other feasible ways to induce at the same time an analytic mindset along with the perception of the closeness of climate change, our findings suggest promising avenues of applications" (p. 72). Hence, these authors also suggest that reducing the psychological distance of climate change might be a worthwhile strategic goal.

In the position paper I outlined in Chapter 2.2.3, van der Linden et al. (2015) proposed communicating proximity as an effective measure to support societal climate change engagement. Referring to only one experimental study, they concluded: "Research has shown that policy frames focussing on the regionally relevant impacts of climate change (and highlight local opportunities for reducing emissions) are often more effective than those that use distant global frames (e.g., Scannell & Gifford, 2013)" (p. 760).

In my research, I focus on proximising climate change in the form of communicating local rather than global or spatially remote impacts. Here, social distance (recipients vs. others) and spatial distance (here vs. somewhere else) are addressed in an integrated manner. The strategy can thus also be described as *communicating socio-spatial proximity vs. distance.* When I started reflecting and working on proximising climate change as a communication strategy, I noticed that the authors proposing it had not explicitly decomposed the psychological process behind the expected effects. However, the basic idea appeared to be that communicating socio-spatial proximity (i.e., local impacts) might decrease recipients' *psychological socio-spatial distance* (i.e., the perception that climate change mostly affects others in remote places), which might in turn increase the *relevance people attributed to the issue* (see e.g., Scannell & Gifford, 2013). Relevance attributed to climate change, in turn, seemed to be expected to raise public engagement with the issue, which I aimed to understand in the form of *climate protective behaviour* and *climate* *change knowledge.* My research thus sought to examine the theoretically assumed process depicted in Figure 1.

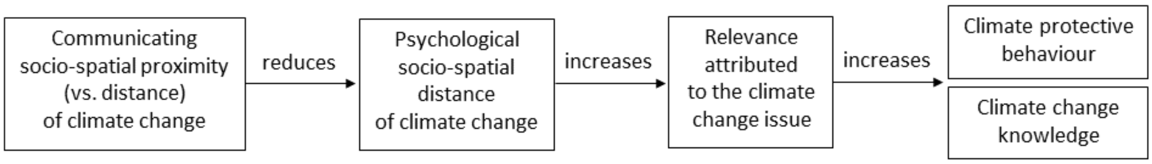


Figure 1. Assumed process behind the communication strategy of proximising climate change

In line with my impression, Brügger, Dessai et al. outlined in 2015 that "although the assumed psychological mechanism of proximizing is often not verbalized [. . .], the rationale behind proximizing climate change seems to be that this approach (a) decreases the psychological distance between the issue and individuals who could or should act, and (b) makes the consequences of climate change easier to visualize and more personally relevant. Moreover, proximizing climate change is believed to increase (emotional) concern and the feeling of being personally vulnerable; ultimately these processes are expected to enhance people's motivation to act" (p. 1031).

In the next section, I explain how the communication strategy of proximising climate change can be understood and located within media effects theory and research, before describing the existing empirical evidence on the assumed process in detail (Chapter 2.3.5).

2.3.4 Communicating proximity in media effects theory and research

Within media effects theory and research, the idea of proximising climate change can be regarded as a form of framing on the one hand (Matthes, 2014; Scheufele, 1999; Scheufele, 2004), and as a news factor on the other (Eilders, 2006; Galtung & Ruge, 1965).

Communicating proximity as a frame. Framing is not a concise theory but rather a research approach mainly used to understand political communication (for an overview, see Entman, Matthes, & Pellicano, 2009; Matthes, 2014). *Framing* in communication can be broadly defined as "selecting some aspects of a perceived reality and constructing messages that highlight connections among them in ways that promote a particular interpretation" (Entman et al., 2009, p. 176). It foregrounds one particular perspective on an issue over other possible perspectives and emphasises some arguments while omitting others. As a means of communication, framing "repeatedly invokes the same objects and traits, using identical or synonymous words and symbols" (p. 178). For example, climate change can be regarded as a threat to the environment, to human health, or to national security. Framing in climate change communication can foreground any one of these perspectives by repeatedly using corresponding words and symbols when outlining arguments for climate protection (Myers, Nisbet, Maibach, & Leiserowitz, 2012).

According to Matthes (2014), who provided a comprehensive overview of framing research, the framing process consists of four elements that are empirically investigated with different methods. *Frames* are the outcomes of this process and can be defined for each of the four elements. First, the *communicator frame*, which is often a strategic frame to promote one's own perspectives, is mainly examined with guided interviews with the actors or content analyses of speeches or press releases (How do communicators such as scientists, politicians, or organisations think and communicate about the issue?). Second, the *journalistic frame* is usually examined in surveys (How do journalists think about the issue?). Third, the *media frame* is examined with content analyses (How is the issue portrayed in the media?). Fourth, the *recipient frame* is mostly examined in surveys or interviews embedded in experiments including media stimuli, or with studies combining surveys or interviews with content analyses of media (How do recipients think about the issue portrayed in the media?). The influence of the communicator frame on the media frame via the journalistic frame has been termed the process of *frame building*, while the influence of the media frame on the recipient frame has been termed *frame setting* or the *framing effect*.

Four explicit and implicit assumptions underlie the framing approach. First, the *principle of ambivalence* assumes that issues can be regarded from different perspectives. Second, the *principle of selection* assumes that frames select and emphasise a certain perspective on an issue. Third, the *principle of consistency* assumes that framing provides a coherent interpretation of an issue. Fourth, the *principle of competition* assumes that frames by different actors compete for sovereignty over the interpretation (Matthes, 2014).

The most research has been conducted on the second step in the framing process, frame setting, and this is also the focus of my research. Within this research, several typical media frames have been identified. Below, I will give a brief overview of the most prominent ones before classifying my own research interest within them. On a general level, a distinction can be made between *generic frames*, which can be applied to different topics or events (e.g., thematic vs. episodic frames, see below), and *issue-specific frames*, which are associated with a certain topic or event (e.g., global justice frame of climate change). In the psychological tradition of framing research, prominent approaches are concerned with generic *equivalence frames* that portray an issue in logically equivalent but linguistically varied ways. Therein, three types of valence framing that convey information in either positive or negative terms have been differentiated (for an overview, see Levin, Schneider, & Gaeth, 1998). First, in *risky choice framing*, options differ in their described level of risk in either a gain frame (e.g., Option A saves 200 people out of 600, while Option B has a 1/3 chance of saving all 600 people and a 2/3 chance of saving nobody) or a loss frame (e.g., with Option A, 400 people out of 600 die, while with Option B, there is a 1/3 chance that nobody will die and a 2/3 chance that all 600 people die; see prospect theory, Tversky & Kahneman, 1981). Second, *attribute framing* consists of presenting an attribute of an object or event either in a positive frame (e.g., ground beef is 75% lean; treatment is successful in 75% of cases) or a negative frame (e.g., ground beef is 25% fat; treatment fails in 25% of cases). Third, *goal framing*, sometimes also called outcome framing, consists of framing information in terms of gains if a behaviour is performed (e.g., gains from climate change mitigation) or losses if a behaviour is not performed (e.g., losses from not undertaking climate change mitigation; see e.g., the study by Spence & Pidgeon, 2010, which I described in Chapter 2.2.3).

In the communication science tradition of framing research, prominent approaches are instead concerned with *emphasis frames* that portray an issue by foregrounding different perspectives and facts and hence are not logically equivalent. An example of generic emphasis framing is Iyengar's (1991) distinction between episodic and thematic framing. While *episodic frames* discuss issues through examples and use a personified perspective (e.g., the issue of migration due to climate change is illustrated through the story of one particular climate refugee), *thematic frames* situate issues in a broader context by including background information and multiple actors (Matthes, 2014).

Framing has been discussed as a valuable approach for understanding climate change communication (e.g., Nisbet, 2009). An extensive amount of content analytical research has investigated media frames of climate change in different countries and different media outlets (e.g., Antilla, 2005; Asplund, Hjerpe, & Wibeck, 2013; Aykut, Comby, & Guillemot, 2012; Billett, 2010; Blasio & Sorice, 2013; Boykoff, 2007; Carvalho & Burgess, 2005; Chetty, Devadas, & Fleming, 2015; Fløttum, Gjesdal, Gjerstad, Koteyko, & Salway, 2014; Jang & Hart, 2015; Mercado, 2012; Schmidt et al., 2013; Uggla, 2008; Wilson Rowe, 2009; Zamith, Pinto, & Villar, 2013). Moreover, experimental research has examined the effects of different media frames on recipient frames of climate change or climate-related cognitions and behaviour (e.g., episodic vs. thematic frames, Hart, 2011; gain vs. loss frames, Bertolotti & Catellani, 2014; Spence & Pidgeon, 2010; health frames vs. other issue-specific frames, Myers et al., 2012; Petrovic, Madrigano, & Zaval, 2014; value threat vs. control threat, Rothschild, Landau, Sullivan, & Keefer, 2012).

In the language of framing approaches, I am investigating the framing effects of generic emphasis frames applied to the specific issue of climate change (i.e., socio-spatial proximity vs. distance of climate change) on recipient frames (i.e., psychological socio-spatial distance of climate change) and further outcomes (i.e., relevance attributed to the climate change issue, climate protective behaviour, climate change knowledge). In addition to framing approaches, the communication strategy of proximising climate change can also be understood from the perspective of news value research.

Communicating proximity as a news factor. News value research is one of the most prominent approaches to explaining the selection of news by journalists (for an overview, see Eilders, 2006). Within this approach, the ideas introduced by Galtung and Ruge (1965) are amongst the most influential. However, Weber and Wirth (2013), for example, argue that their original outline is not only concerned with news selection but more broadly with news diffusion. On the one hand, it asks which characteristics of events influence selection and representation in the media by journalists. On the other hand, it assumes that similar processes influence the selection and representation of events by media recipients. Journalists and recipients select pieces of news and assign news value to them on the basis of certain criteria. Criteria of news that promote their selection and processing are called *news factors*. The *news value*, in turn, is determined by the number and strength of all applicable news factors. Several lists of news factors containing *proximity* in general or in different specifications (e.g., cultural, geographical, political, economic proximity) have been proposed (see Eilders, 2006).

In general, empirical studies that are theoretically based on the concept of news value tend to examine how journalists decide which topics to portray in the media. Far less research examines recipients' selection and evaluation of media content. I did not find any empirical studies on climate change communication based on news value approaches. However, in the language of these approaches, I am investigating the effects of a specific news factor (i.e., socio-spatial proximity of climate change) on recipients (i.e., psychological socio-spatial distance, relevance attributed to the climate change issue, climate protective behaviour, climate change knowledge) in my research.

In the following section, I will outline theoretical assumptions and empirical results related to the process underlying the communication strategy of proximising climate change.

2.3.5 Empirical findings on proximising climate change

Even though several scholars have recommended proximising climate change by focussing on local instead of global or spatially remote consequences, their suggestions have been grounded in only a few empirical investigations (e.g., van der Linden et al., 2015). When I collected and analysed the empirical evidence in detail, I realised that the results are few and actually not conclusive. In line with my impression, Brügger, Dessai et al. (2015), Brügger et al. (2016) and McDonald et al. (2015) have also recently raised doubts about whether such a proximising strategy has reliable main effects on public engagement. They argued that empirical evidence on the effects of communicating proximity vs. distance is too scarce and mixed and that more research is needed to extend and disentangle the existing results. In the following subsection, I depict the eight experimental studies I am aware of that systematically varied the communicated socio-spatial proximity vs. distance of climate change and examined causal effects on outcomes related to public engagement with climate change.

2.3.5.1 Experiments on communicating socio-spatial proximity vs. distance

In my review of the literature, I found eight experimental studies that systematically varied the communicated socio-spatial proximity vs. distance of climate change (i.e., they communicated climate change as affecting the location where recipients live vs. global or distant locations and/or people). In this section, I describe them in detail with regard to crucial aspects of their design (setting, participants, stimulus material, dependent variables) and effects of the proximity vs. distance variation on climate change-related outcomes. I include the reported effect sizes or effect sizes I calculated myself based on the reported information, if possible. Subsequently, I will summarise the results of these studies and draw conclusions about what is known about the effects of proximising climate change in communication and what these results indicate for my research question.

First, Shwom et al. (2008) conducted a mail-based experiment with randomly selected US households in Michigan and Virginia with N = 366 respondents. Participants received one page of information on recent and future climate trends as well as either key issues in their region (proximity condition; e.g., water resources in the Great Lakes) or the whole nation (distance condition). The information was based on the 'U.S. Global Change Research Program'. A probit regression showed no difference in willingness to support eight separately analysed policy measures to reduce fossil fuel burning between the two information conditions.

Second, Spence and Pidgeon (2010) conducted an online experiment with N = 161 psychology students in Cardiff, Wales, applying a 2 (communicating proximity vs. distance of climate change) × 2 (communicating losses due to climate change vs. gains due to climate mitigation) between-subject design. Participants received information based on the IPCC report on climate change impacts either for the UK and South Wales (proximity condition) or continental Europe (distance condition). In addition, it contained maps and photographs showing potential flooding in either Cardiff or Rome. Participants in the proximity condition rated the information as more personally relevant (d = 0.73), measured by a scale of four items. Information processing, indicated by the number of freely recalled statements from the article and the number of thoughts that occurred to participants while reading the information, did not differ between the proximity and distance conditions. Nor were there differences regarding attitudes towards climate change mitigation. Participants in the distance condition rated the severity of climate change, which was measured with three items, higher than participants in the proximity condition (d = 0.35).

Third, Wiest et al. (2015) conducted a laboratory experiment applying a similar 2 (communicating proximity vs. distance of climate change) × 2 (communicating losses vs. losses and gains due to climate change) between-subject design with N = 198 US residents in Indiana (it is unclear whether it was a student sample). Participants received one of four videos (9 to 12 minutes) showing a speech by a climate scientist. The scientist focussed either on local climate change impacts in Indiana (proximity condition) or global impacts for various international locations (distance condition). Moreover, he either stated only losses due to climate change or both losses and benefits. An ordered logistic regression analysis revealed that participants who had watched the video focussing on local climate change impacts rated the severity of climate change for Indiana as higher than participants in the distance condition. Furthermore, they evaluated the priority of climate change for the government in Indiana as higher. There were no differences, however, between the proximity and distance conditions in perceptions of the severity of climate change for the US and the world, and no differences on a 2-item index assessing behavioural intentions to contribute to climate change mitigation. Moreover, there was also no difference in participants' ratings of how much policy effort the state of Indiana, the United States, and the international community should make in reducing climate change.

Fourth, in a mail-based experiment by Scannell and Gifford (2013), a Canadian community sample comprising N = 324 residents of British Columbia either received a one-page information poster about climate change impacts in their local area (proximity condition), about impacts on a global scale (distance condition), or no information (control condition). All messages included text and photographs, were equal in length, and were kept constant with respect to content to the greatest extent possible. However, they varied in the type of communicated impacts (e.g., local forest fires in the Okanagan region, local sea level rise in the Vancouver Island region; global sea level rise). The authors mentioned that they consulted climate change experts when constructing the material and that they portrayed "the impacts in a way that made them appear more extreme" (p. 10), but included a participant debriefing at the end of the study. They included suggestions of how individuals could protect the climate. In order to increase the effect of the local versus global communication, they asked participants to write down a further either local or global impact they had witnessed or could imagine happening. As the dependent variable, participants indicated their climate change engagement on 16 items comprising affective, cognitive, and behavioural components. Participants who denied that climate change existed were excluded from the analyses of the results. A hierarchical regression analysis revealed that participants confronted with a local message reported higher climate change engagement than participants in the no-message control condition (β = .12). There was no difference in climate change engagement between participants in the global message condition and the control condition. Unfortunately, the authors did not compare the local and global message conditions. Hence, concrete results on effects of proximising are lacking.

Fifth, Hart and Nisbet (2012) conducted a field experiment with N = 240 non-student adults recruited in a mall in an upstate New York community. Participants either read a news story about climate change victims in upstate New York (proximity condition), in the state of Georgia or in France (distance condition), or received no information (control condition). The text was based on facts reported by the Associated Press and included pictures of victims that were equal in both conditions. The design of the stimulus material imitated a realistic news article. The authors measured support for climate mitigation measures by the government with three items as the dependent variable, identification with the victims with four items as a proposed mediator of the message effect, and participants' partisanship on a continuum from Democrat to Republican with one item as a proposed moderator. Unfortunately, support for climate mitigation was not compared as a potential main effect between the proximity and distance conditions. The authors report that Democrats' identification with the victims did not differ in the proximity condition compared to the distance condition. Independents and Republicans expressed greater identification in the proximity condition, which in turn predicted their support for climate mitigation measures. However, the provided statistical data are difficult to interpret as the direction of the effects remains unclear (see Table 2, p. 712; only unstandardised coefficients are reported). Compared to the control condition, participants in neither the proximity condition nor the distance condition differed in their support for climate mitigation measures. However, taking partisanship into account revealed interaction effects between partisanship and the distance vs. control condition ($\beta = -0.34$) as well as between partisanship and the proximity vs. control condition ($\beta = -0.19$[1]). The authors state that decomposing these interaction effects revealed that for Democrats, both message conditions increased support for climate mitigation policies compared to the no-message control condition. The high distance message decreased support compared to the control condition as participants identified more with the Republican party. However, as they only refer to a figure and do not fully report the statistical details of their analyses, these results have to be interpreted with caution.

Sixth, in an online experiment with $N = 99$ US residents by Schoenefeld and McCauley (2016), participants either received information about local climate change impacts in the Vermont/New England area (proximity condition); global climate change impacts, for example in Pakistan (distance condition); or no information (control condition). The information stemmed from the 'Global Climate Change Impacts in the United States Report' as well as the IPCC report. Respondents' personal issue importance of climate

[1] The description whether this interaction is significant differs between text (p. 713) and table (p. 714).

change was measured with three items. Moreover, participants indicated their willingness to engage in 48 climate-protective behaviours and their support for eight climate change policies. An analysis of variance revealed no effects of the information condition on the three dependent variables.

Seventh, Brügger et al. (2016) conducted two studies. In Study 1, N = 80 psychology students in the UK received one of two texts on the causes and consequences of climate change upon arrival in the classroom. The origin of the contents is not stated by the authors, but the appendix shows that they consisted of main statements from reports like the IPCC report. The text either referred three times to the UK (proximity condition) or used the formulations "all over the world", "across the globe", or "the planet" instead (distance condition). Participants in the proximity and distance conditions did not differ in their support for 11 climate change mitigation policy measures, their intentions to personally mitigate climate change via 10 actions, their support for 12 climate change adaptation policy measures, and their intentions to personally adapt to climate change via nine actions. In an online pretest for Study 2, N = 89 UK students received a text on climate change causes and consequences referring twenty times either to places in the UK (proximity condition) or worldwide (distance condition). Psychological distance as assessed by five semantic differentials did not differ between conditions, but participants in the proximity condition had a more concrete (vs. abstract) thinking style than participants in the distance condition as assessed by a picture completion task. The main online experiment for Study 2 included N = 330 UK residents. It had a 2 (communicated fear in video on climate change: low vs. high) × 2 (communicated proximity vs. distance of climate change in text) between-subject design. As a cover story, participants were asked to evaluate a video and a text as two forms of communicating climate change for a future study. The proximity manipulation was further intensified by asking three questions repeating the condition-specific content, which were introduced as reading checks. Participants' psychological distance of climate change was only marginally lower in the proximity condition than the distance condition (r = .10, p = .08). There was no difference between conditions in support for policy measures and intentions to engage in climate mitigation actions, both assessed with 11 items, respectively. However, the proximal communication led to a higher personal and proximal risk perception (r = .12). Contrary to the authors' expectation, they did not find interaction effects with communicated fear.

Eighth, Jones et al. (2017) conducted an online experiment with a sample of N = 333 Australian adults. They received one of two videos (4 to 5 minutes) containing text and images. In the proximity condition, recent (low temporal distance) events in Australia (low socio-spatial distance) were linked to climate change (low hypothetical distance). In the distance condition, events overseas (high socio-spatial distance) were outlined. This video further emphasised that severe climate change impacts are expected in the distant future (high temporal distance) and the predictions are contradictory (high hypothetical distance). Hence, the variation was not restricted to socio-spatial distance but also includes temporal and hypothetical distance and is thus not as clean as in the other experiments. Psychological distance regarding the four dimensions was assessed with 26 items, climate change concern with seven items, and mitigation intentions with seven items. Participants in the distance condition perceived climate change as more psychologically distant than participants in the proximity condition with respect to social (β = .22), spatial (β = .16), and hypothetical distance (β = .15), but not temporal distance. The authors also state that participants in the proximity condition expressed stronger concern and mitigation intentions, but corresponding descriptive values and statistical results are not reported. This study is the first to go beyond simple main effects to model a possible process underlying the effects of proximising climate change as well. A path analysis showed that communicating distance compared to proximity indirectly predicted lower climate change concern through increased psychological distance (indirect relation, β = -.15) and that concern in turn positively predicted mitigation intentions (direct relation, β = .88, serial indirect relation, β = .12).[2]

In summary, reviewing the existing experimental evidence on proximising climate change reveals variation with regard to sample, setting, material, measures, and analyses. I noticed some limitations that I regard as relevant. A limitation of the two studies with student samples (Brügger et al., 2016, Study 1; Spence & Pidgeon, 2010) is the inclusion of social science students who might be too familiar with experimental research. With regard to the design of the stimulus material, the studies used written materials, described as information material (Brügger et al., 2016; Shwom et al., 2008; Spence & Pidgeon, 2010), a poster (Scannell & Gifford, 2013), or videos (Jones et al., 2017; Wiest et al., 2015). Only one study designed the message as a news article (Hart & Nisbet, 2012),

[2] It is not fully clear whether the effect sizes of the indirect paths can be interpreted as outlined as they are reported ambiguously. The authors state that in the mediation analysis, they took psychological distance as a group and I assume that they mean as a superordinate factor.

which is in my view a more externally valid and practically relevant format. A further limitation regarding the external validity of these studies with respect to a natural reception situation concerns the measures taken to increase the effects of the experimental manipulations, such as asking participants to pay close attention and informing them that questions on the text will follow (Spence & Pidgeon, 2010), exaggerating the expected effects of climate change and asking participants to write down a further local or global impact (Scannell & Gifford, 2013), or asking questions that repeat condition-specific information (Brügger et al., 2016). I argue that such measures not only reduce external validity but might also lead to an overestimation of possible effects. Finally, comparisons of a proximal or distant communication with a no-message control condition (Scannell & Gifford, 2013) are less insightful than direct comparisons between proximal and distant communication as they cannot illuminate the concrete effect of proximising per se but include stimulus exposure in general.

In the following sections, I will sort and summarise the results of these experimental studies with regard to my research aim of understanding the process behind possible effects of proximising climate change, which I depicted in Chapter 2.3.3. In doing so, I differentiate the psychological variables involved in the assumed steps (i.e., psychological socio-spatial distance of climate change, the relevance attributed to the climate change issue, climate protective behaviour, and climate change knowledge). I complement the experimental evidence with results from correlational studies as well as selected research findings on issues other than climate change that seem informative. On the basis of these findings, I will formulate the hypotheses of my research.

2.3.5.2 Impact of proximising on psychological socio-spatial distance of climate change

The first step of the assumed process underlying possible effects of proximising climate change is a reduction of psychological socio-spatial distance (see Figure 2).

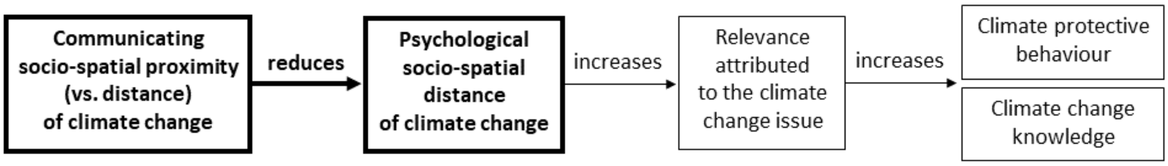


Figure 2. First step of the assumed process behind the communication strategy of proximising climate change.

Only two of the experimental studies on the effects of communicating socio-spatial proximity vs. distance of climate change explicitly included measures of psychological distance (Brügger et al., 2016; Jones et al., 2017). Social, spatial, and hypothetical distance but not temporal distance decreased in the proximity condition compared to the distance condition in the study with Australian adults by Jones et al. (2017), which varied proximity regarding all four dimensions of distance at once (i.e., social, spatial, temporal, hypothetical). Brügger et al. (2016, Study 2) only found a tendency towards reduced psychological distance (overall measure including all four distance dimensions) in their socio-spatial proximity compared to distance conditions in their sample of UK residents. A possible explanation could be that they did not differentially consider the separate dimensions of psychological distance. Although empirical evidence is limited, the results imply that psychological distance could be affected by communicating proximity vs. distance. My research thus examined the following hypothesis:

H1: Communication of socio-spatial proximity (vs. distance) of climate change in news coverage reduces recipients' psychological socio-spatial distance of climate change.

Due to the limited evidence, I consider it important to additionally examine whether recipients' *perceived communicated socio-spatial distance of climate change* in this news coverage is affected by proximising climate change as a direct manipulation check.

2.3.5.3 Impact of proximising on issue relevance of climate change

The second step of the assumed process underlying possible effects of proximising climate change is an increased relevance attributed to the climate change issue and hence, a negative relation between the psychological socio-spatial distance of climate change and issue relevance (see Figure 3).

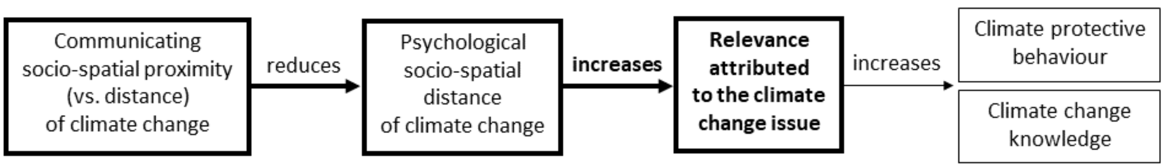


Figure 3. Second step of the assumed process behind the communication strategy of proximising climate change.

The relevance attributed to an issue that is communicated in general, or portrayed in news coverage in particular, is not a uniformly applied concept or term (for an overview, see Weber & Wirth, 2013). Other related terms include issue importance, perceived salience, informational utility, or the newsworthiness of a piece of media content for an individual (Kim, 2008; Knobloch, Zillmann, Gibson, & Karrh, 2002; Wirth, 2006). Moreover, relevance attributions can also be regarded as part of the broader concept of involvement (Wirth, 2006), which can be applied to issues reported in the news.

However, the term involvement in an issue is also used in a way that is conceptually similar to psychological proximity in the sense that something has a personal impact on one's life (e.g., Oschatz, 2018). For my research question, it is important to emphasise that I regard the psychological socio-spatial distance of climate change (i.e., the perception that climate change mainly affects others in remote places) and the issue (ir)relevance of climate change (i.e., the evaluation that the issue is relevant or irrelevant) as conceptually distinct. Even though some authors seem to equate the two, I deem it necessary to empirically test their relation.

Trope and Liberman (2010) drew an implicit connection between psychological distance and the relevance of an issue in their review of CLT. There, they stated that "distance from an outcome might also reduce personal involvement, thus giving rise to shallow processing and less cautious predictions" (p. 451). However, involvement or relevance are not clearly associated with psychological distance in their concrete theoretical assumptions. Moreover, to my knowledge, issue relevance has been rarely investigated so far in relation to psychological distance.

Regarding the experimental studies on communicating socio-spatial proximity vs. distance of climate change, Schoenefeld and McCauley (2016) found no effect of communicating socio-spatial proximity vs. distance of climate change to US residents on the relevance attributed to the climate change issue. One of the experimental studies investigated how relevant the received information was evaluated to be. Compared to communicating distance, proximising climate change increased the relevance attributed to the received information on climate change in UK students (Spence & Pidgeon, 2010). Interestingly, the authors interpret this effect as a manipulation check for the proximity vs. distance variation and thus seem to equate the communicated socio-spatial distance of climate change and issue relevance of climate change. However, they did not assess psychological socio-spatial distance. Hence, a relation between psychological socio-spatial distance and issue relevance cannot be inferred from their study.

Similarly, recent news value research implicitly implied that news factors including proximity raise issue relevance. Eilders (2006), for example, argued that the proximity of a piece of news content is an indicator of its social relevance for the society an individual lives in. Events taking place “close to our homes are more likely to have an effect [on our lives] than events that take place far away” (p. 15). Related to this, Pape, Quandt, Scharkow, and Vogelgesang (2012) found that people were more interested in news about a foreign country the geographically closer it was. However, the explicit relation between news factors and relevance attribution has rarely been empirically tested, and particularly not in experiments that would allow causal inferences to be made.

Therefore, Weber and Wirth (2013) investigated whether several news factors, including proximity, impact the relevance attributed to news content. They stated that proximity in particular had been neglected in prior research on news factors and relevance attribution and aimed to close this gap. In a laboratory experiment, N = 53 students in Switzerland were provided with a news article on child obesity in England (proximity condition) or Mexico (distance condition). They assessed the perceived distance of the communicated event with three items as a manipulation check and found that it was higher in the distance condition. Moreover, they assessed relevance attribution with three items. Proximity increased the relevance attributed to the news article (η_p^2 = .10). Even though empirical evidence is limited, the theoretical reasoning within CLT and news value approaches described above as well as the results of the outlined studies imply that the relevance attributed to a communicated issue could be negatively related to psychological socio-spatial distance. Moreover, it might be indirectly increased by communicating socio-spatial proximity vs. distance through reducing psychological socio-spatial distance. My research thus examined the following hypothesis:

H2: Communication of socio-spatial proximity (vs. distance) of climate change in news coverage increases the relevance attributed to the climate change issue indirectly through reduced psychological socio-spatial distance of climate change.

2.3.5.4 Impact of proximising on climate protective behaviour

The third step of the assumed process underlying possible effects of proximising climate change is increased public engagement in the form of climate protective behaviour through reduced psychological socio-spatial distance and increased issue relevance (see Figure 4).

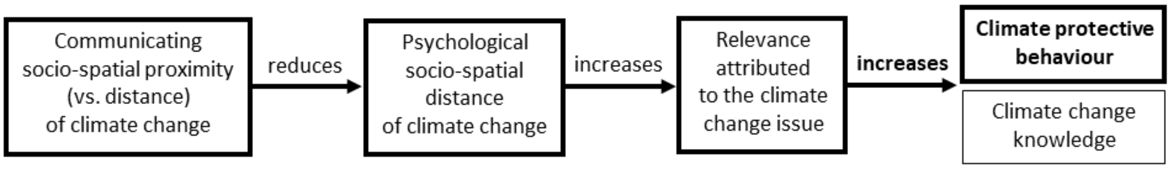


Figure 4. Third step of the assumed process behind the communication strategy of proximising climate change (climate protective behaviour).

Effect of communicating proximity on climate protective behaviour. In the experimental studies on communicating socio-spatial proximity vs. distance of climate change, indicators of climate protective behaviour in the form of hypothetical policy support or behavioural intentions were not affected in the majority of the studies. Compared to communicating distance, communicating proximity did not influence support for climate protective policy measures (Brügger et al., 2016; Schoenefeld & McCauley, 2016; Shwom et al., 2008; Wiest et al., 2015) and behavioural intentions to mitigate climate change (Brügger et al., 2016; Schoenefeld & McCauley, 2016; Wiest et al., 2015) in samples of US and UK citizens from the general public as well as UK students. Moreover, it did not affect support for climate adaptation policy measures and behavioural intentions to adapt to climate change in a sample of UK students (Brügger et al., 2016). Compared to a no-message control condition, communicating climate change as either proximal or distant to US citizens had no effect on support for climate protective policy measures if partisanship was not taken into account as a moderator (Hart & Nisbet, 2012). Two studies, however, found effects on behavioural outcomes. Compared to communicating distance, proximising climate change (on all four dimensions suggested in CLT) increased mitigation intentions in Australian citizens; however, statistical details are missing (Jones et al., 2017). Compared to a no-message condition, communicating proximity increased climate change engagement (including affective, cognitive, and behavioural components) among Canadian citizens, while communicating distance did not (Scannell & Gifford, 2013). A limitation of these findings is that none of the studies considered actual climate protective behaviour but only hypothetical behaviour and behavioural intentions.

Relation between psychological socio-spatial distance and climate protective behaviour. It has been argued that the psychological socio-spatial distance of climate change might be negatively related to individuals' climate protective behaviour (Milfont, 2010; Spence et al., 2012). Spence et al. (2012) found in their sample of N = 1,822 residents in Great Britain that the less people expected impacts on people like themselves, as an indicator of social distance, the less prepared to act they reported being (β = -.08). However, perceiving stronger impacts for developing countries, as an indicator of socio-spatial distance, was a positive predictor (β = .07).

In Carmi and Kimhi's (2015) study with N = 305 Israeli students, their 3-item index of the psychological (including social, temporal, hypothetical) distance of climate change was negatively related to self-reported willingness to make six behavioural sacrifices for environmental protection (β = -.38).

Sacchi et al. (2016) found in their study with N = 171 Italian students that their 3-item index of the psychological (including spatial, temporal, hypothetical) distance of climate change was negatively related to a 7-item scale regarding proenvironmental behavioural intentions (r = -.42).

In the experiment by Jones et al. (2017) with N = 333 Australian adults, their differentiated measures of the psychological spatial, social, temporal, and hypothetical distance of climate change were related to a 7-item measure of climate mitigation intentions. Interestingly, social and spatial distance were less strongly associated than temporal and hypothetical distance (rs = -.16, -.41, -.70, -.62, respectively). Jones et al. are also the only study I am aware of to model a process underlying the impact of proximising, which is similar to the process I theorised. They found that proximising climate change indirectly and positively predicted mitigation intentions through lower social and hypothetical distance and higher climate change concern (serial indirect relation).

Three further studies did not explicitly aim to investigate the concept of psychological distance as theorised in CLT, but nevertheless included measures reflecting the psychological proximity of climate change. Spence et al. (2011) found in a sample of N = 1,822 UK residents that the more people believed their local area would be affected by climate change (i.e., psychological socio-spatial proximity), the more prepared they were to reduce their energy use in order to tackle climate change (β = .07).

Similarly, Taddicken (2013) found in a sample of N = 1,523 German Internet users that the more people perceived an influence of climate change on their life in the present, past, and future, the more they supported climate protective measures as assessed by 5 items (β = .22; for the concrete items, see Taddicken & Neverla, 2011).

Brügger, Morton et al. (2015) conducted two online surveys with samples of N = 316 adults in Switzerland and N = 612 adults in the UK from the general public. They asked participants to rate the likelihood that seven risks would occur due to climate change close to where they lived (perceived proximal risks) and far from where they lived (perceived distant risks). Moreover, they assessed policy support for 14 propositions regarding climate change mitigation and 15 propositions regarding climate change adaptation. In the UK sample, they additionally assessed intentions to engage in 10 climate mitigation behaviours and eight climate adaptation behaviours. The perceived likelihood of distant risks, but not proximal risks, predicted mitigation policy support ($\beta = .25$) and adaptation policy support ($\beta = .39$). The perceived likelihood of proximal risks predicted mitigation intentions ($\beta = .14$) and adaptation intentions ($\beta = .29$), whereas the perceived likelihood of distant risks only predicted mitigation intentions ($\beta = .15$). Hence, only with regard to adaptation intentions were perceived proximal climate change consequences more predictive than perceived distant consequences.

In addition to these explicit results on relations between the psychological socio-spatial distance and proximity of climate change and self-reported climate protective behavioural intentions and policy support, indirect indicators of psychological distance or proximity as well as results on environmental issues more generally can be considered when inferring hypotheses. Below, I outline selected insightful evidence.

As an indirect indicator for the spatial proximity of climate change consequences, Milfont, Evans, Sibley, Ries, and Cunningham (2014) found in a probability sample of N = 5,815 New Zealanders that the closer people lived to the shoreline, the greater their agreement that the government should regulate carbon emissions, which served an indicator of policy support (B = -.036, indicating that for every 10 km farther from the coast, participants' support was .036 units lower on a 7-point scale based on one item).

In a study with N = 162 farmers in California, van Haden, Niles, Lubell, Perlman, and Jackson (2012) did not assess how proximal or distant climate change consequences were perceived, but rather concerns about local water availability and temperature change, on the one hand, and concerns about and belief in global climate change, on the other hand. They modelled these concerns as separate predictors of willingness to adopt two mitigation practices (energy efficiency and renewable energy) and two adaptation practices (irrigation and cropping). Local water concerns were related to adaptation intentions in the form of adopting new irrigation practices (B = 0.23, 4-point scale and 5-point scale, respectively). Global concerns were related to mitigation intentions in the form of adopting energy efficiency practices (B = 0.17 and 0.14, 5-point scales) and renewable energy practices (B = 0.33 and 0.27, 5-point scales). All other relations were insignificant. However, it is important to mention that their global measure does not seem to reflect psychological distance. From the perspective of CLT, it might rather be interpreted as an indicator of hypothetical proximity (i.e., certainty about climate change and its consequences).

In their study with N = 3,277 students in 22 countries, Schultz et al. (2014) examined several predictors of their criterion variable spatial bias of environmental problems (i.e., rating the severity of environmental problems as higher worldwide than in one's own community), which can be interpreted as psychological socio-spatial distance. Hence, the causal reasoning behind their analysis was in the opposite direction as my research question. They found that an index of 12 self-reported proenvironmental behaviours did not predict spatial bias in a multi-level analysis including further variables.

Busse and Menzel (2014) assessed perceptions of sustainability issues, including socio-spatial distance, and willingness to engage in proenvironmental actions in a sample of N = 938 adolescents in German schools. In Subsample 1, the questionnaire referred to Germany, in Subsample 2, to an unspecified developing country. Participants were not randomly allocated to the questionnaire versions. They found no relation between their dummy-coded variable of socio-spatial distance (0 = Germany, 1 = developing country) and an 11-item measure of willingness to engage in proenvironmental behaviour in a structural equation model (SEM).

Relation between issue relevance and climate protective behaviour. Models of information processing, including the elaboration likelihood model (ELM, Petty & Cacioppo, 1986), assume a relation between the relevance attributed to an issue communicated in a message and behavioural motivation resulting from reception of the message. Here, the focus is on persuasive messages, and it is assumed that the relevance of a message to recipients is one of the factors determining how profoundly it is processed (i.e., the extent to which it is processed via the so-called central route rather than the peripheral route of information processing). The more relevant a message is perceived to be, the more intensely it is cognitively elaborated, which results in better retention of the message as well as attitude and behaviour changes regarding the communicated issue. Research on the ELM is mostly experimental and tries to vary issue relevance in order to examine its causal effect on information processing, knowledge acquisition, and behaviour change (e.g., Petty & Cacioppo, 1979; Petty, Cacioppo, & Goldman, 1981). The model has often been applied to mass media communication (Priester, Brinol, & Petty, 2009; Xu, 2017). Moreover, a few studies have examined assumptions made by the ELM relating to climate change communication (e.g., Bråten, Strømsø, & Salmerón, 2011; Lazard & Atkinson, 2014; Meijnders, Midden, & Wilke, 2001).

I found one study specifically examining the relation between issue relevance and climate protective behaviour. Visser, Krosnick, and Simmons (2003) found in two representative samples of the US population (N = 688 and N = 725, analysed together) that the more important people considered the climate change issue to be (5-point scale coded 0 to 1), the more likely it was that they had given money to an organisation concerned with global warming or air pollution (B = 2.83, dichotomous variable coded 0 and 1) and written a letter to a public official or attended a meeting to discuss global warming or air pollution (B = .06, 3-point scale coded 0 to 1).

Furthermore, Göckeritz et al. (2010) assumed that the importance individuals attribute to energy conservation issues predicts how energy-conserving they behave. In a telephone interview study with N = 1,604 California residents, they assessed personal issue involvement with four items (i.e., how much respondents think about the issue, care about the issue, and how big of an issue it is in their life. As a fourth item, this measure also included one question concerning self-reported knowledge, which obviously seems to be correlated). Moreover, they asked how often participants try to conserve energy. They found a positive relation between their measure of personal involvement and self-reported conservation behaviour (r = .46).

In sum, evidence on the effects of communicating proximity vs. distance of climate change on climate protective behaviour and on the relation between psychological socio-spatial distance and climate protective behaviour is mixed. All outlined studies assessed only behavioural intentions or hypothetical policy support instead of actual behaviour, and most of them found small or no effects and relations. None of the outlined studies explicitly examined the often implicitly assumed mechanism that psychological socio-spatial distance decreases the relevance of the issue and therefore reduces behavioural engagement. Consequently, my research examined the following hypothesis, which represents the assumed process underlying possible effects of proximising climate change:

H3: Communication of socio-spatial proximity (vs. distance) of climate change in news coverage increases climate protective behaviour indirectly through reduced psychological socio-spatial distance of climate change and increased relevance attributed to the climate change issue (serial indirect relation).

2.3.5.5 Impact of proximising on climate change knowledge

The third step of the assumed process underlying possible effects of proximising climate change can also lead to increased public engagement in the form of climate change knowledge through reduced psychological socio-spatial distance and increased issue relevance (see Figure 5).

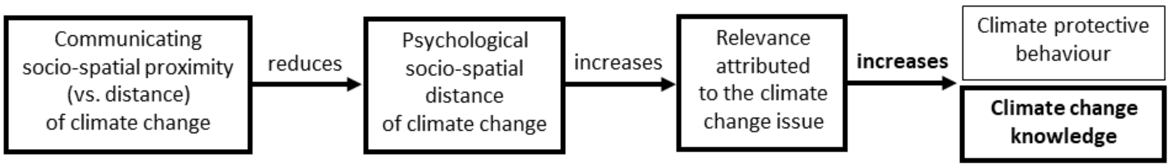


Figure 5. Third step of the assumed process behind the communication strategy of proximising climate change (climate change knowledge).

To my knowledge, it has not yet been studied systematically whether the four dimensions of psychological distance influence memory, such that information about psychologically close issues is remembered better, while information about psychologically distant issues is forgotten more easily. As noted above, Trope and Liberman (2010) posited that distance from an outcome might reduce personal involvement and thus result in shallow processing (p. 451). Shallow processing in turn usually leads to less retention. Basic memory research indicates that concrete information is encoded better than abstract information (e.g., Just & Brownell, 1974). The former is associated with low-level construals and psychological proximity, while the latter is associated with high-level construals and psychological distance. Accordingly, journalists try to transmit their messages with concrete examples of individuals' fates rather than abstract facts in order to reach their audience and ensure that their message remains in memory (e.g., Zillmann, 2002).

Effect of communicating proximity on climate change knowledge. Only one of the outlined experimental studies (*N* = 161 UK students) investigated climate change knowledge inferred from receiving proximal vs. distant information on climate change. Participants who received information on proximal climate change consequences remembered the information equally well as participants who received information on distant climate change consequences (Spence & Pidgeon, 2010).

In an experiment unrelated to the climate change issue but involving a news text communicating proximity vs. distance of an issue, Knobloch et al. (2002) presented N = 240 US undergraduate students from Alabama and Texas with a newspaper article about the outbreak of a fictitious disease either in Alabama or Texas. Subsequently, they asked participants how newsworthy, informative, and useful to them personally they found the text. Moreover, they assessed how strongly participants felt personally threatened by the health issue communicated in the text. As a measure of knowledge about the communicated content, they constructed 15 multiple-choice items. In the conditions in which the article matched the respondents' domicile, participants found the article more newsworthy and personally useful, rated the personal threat higher, and acquired more knowledge about the content.

A similar study was conducted by Wise, Eckler, Kononova, and Littau (2009) with N = 50 undergraduate students in the US. Participants were provided with four news stories either about local health threats in the town where they lived (proximity condition) or health threats 500 miles away (distance condition). Each participant read two proximal and two distant texts in a fractional within-subject design. They found that the contents of the proximal stories were better remembered than the contents of the distant stories, as assessed with a 16-item measure on recognition of the communicated content with four questions for each story.

Relation between psychological socio-spatial distance and climate change knowledge. I am not aware of any studies examining the relation between the psychological socio-spatial distance of climate change and climate change knowledge. However, Taddicken (2013) found in a sample of N = 1,523 German Internet users that the more people perceived that climate change influenced their life in the present, past, and future (i.e., an indicator that can be interpreted as reflecting psychological socio-spatial proximity of climate change), the more they knew about climate change as assessed by 13 factual questions (β = .39; for the concrete items, see Taddicken & Neverla, 2011).

Relation between issue relevance and climate change knowledge. The ELM (Petty & Cacioppo, 1986) suggests a relation between issue relevance and knowledge acquisition regarding the issue parallel to the relation between issue relevance and behavioural engagement (see Chapter 2.3.5.4). The assumption is that the more relevant a message is perceived to be, the more intensely it is cognitively elaborated and remembered.

In sum, evidence on the effects of communicating proximity vs. distance of climate change on climate change knowledge and on the relation between psychological socio-spatial distance and climate change knowledge is limited. None of the outlined studies investigated the mechanism that psychological socio-spatial distance decreases the relevance of the issue and therefore reduces climate change knowledge. Consequently, my research examined the following hypothesis, which represents the assumed process underlying possible effects of proximising climate change:

H4: Communication of socio-spatial proximity (vs. distance) of climate change in news coverage increases climate change knowledge indirectly through reduced psychological socio-spatial distance of climate change and increased relevance attributed to the climate change issue (serial indirect relation).

In the following subsection, I will outline evidence on the relation between the two main dependent variables of my research, namely climate change knowledge and climate protective behaviour.

2.3.5.6 Relation between climate change knowledge and climate protective behaviour

Generally, knowledge is often thought to be a precondition for behaviour. In the political domain, for example, political knowledge has been found to predict political participation (Galston, 2001). However, there is mixed evidence on the potential relation between knowledge and behaviour in the environmental domain, and the usefulness of efforts aimed at improving public knowledge has thus been critically discussed (Otto & Kaiser, 2014; Otto & Pensini, 2017; Shi, Visschers, Siegrist, & Arvai, 2016). Below, I will first outline relevant results regarding environmental knowledge and behaviour before turning to climate change-related knowledge and behaviour more specifically.

Environmental knowledge and proenvironmental behaviour. An early and often cited meta-analysis found a medium-sized relation between environmental knowledge and proenvironmental behaviour of $r = .30$ (Hines, Hungerford, & Tomera, 1987). Kaiser and Frick (2002) found a correlation corrected for measurement error of $r = .43$ between their 61-item measure of environmental knowledge and self-reported proenvironmental behaviour as assessed by a 65-item version of the General Ecological Behaviour (GEB) scale in a sample of *N* = 827 students and lecturers in Switzerland.

In an online survey study with *N* = 168 respondents from the general public in Argentina and *N* = 130 students in Colombia, a 36-item measure of environmental knowledge was correlated with a 13-item self-reported behaviour scale (*r* = .44) and a 10-item self-reported behaviour scale (*r* = .26), respectively (Geiger, Otto, & Diaz-Marin, 2014).

Kaiser and Fuhrer (2003) suggested a conceptualisation of environmental knowledge that comprises system knowledge (causes and consequences of environmental problems), action-related knowledge (individual behaviours with an impact on a healthy environment), and effectiveness knowledge (relative impact of these behaviours). They reasoned that knowledge about proenvironmental actions and their effectiveness should be more strongly related to proenvironmental behaviour than knowledge about the environmental system, and that the latter might only exert an indirect impact through the other two forms of knowledge. Confirming this reasoning, Frick, Kaiser, and Wilson (2004) found in their sample of *N* = 2,736 Swiss adults that action-related environmental knowledge (β = .18) and effectiveness environmental knowledge (β = .12) predicted self-reported proenvironmental behaviour as assessed by a 50-item version of the GEB scale, while system knowledge only predicted it indirectly via the other two knowledge types. Overall, 6% of the behavioural variance was explained by knowledge.

Díaz-Siefer, Neaman, Salgado, Celis-Diez, and Otto (2015) conducted a study with *N* = 950 adults in Chile and assessed system knowledge with 18 items, action-related knowledge with 17 items, and self-reported proenvironmental behaviour with a 35-item version of the GEB scale (their items on effectiveness knowledge did not form a reliable scale and were thus not analysed). They found that both system knowledge (*r* = .25) and action-related knowledge (*r* = .22) were directly related to proenvironmental behaviour.

In their survey study with *N* = 1,907 pupils in German classrooms, Roczen, Kaiser, Bogner, and Wilson (2014) found that effectiveness knowledge did not predict self-reported proenvironmental behaviour as assessed by a 40-item version of the GEB scale, while action-related knowledge did (β = .15). System knowledge in turn predicted action-related knowledge (β = .54). The authors do not report an indirect relation. It should be noted that knowledge levels in general as well as variance in knowledge were rather low in the sample, thus limiting its predictive potential.

Climate change knowledge and climate protective behaviour. O'Connor, Bord, and Fisher (1999) found in a sample of N = 1,225 randomly selected adults in the United States that their measure of climate change knowledge (number of incorrect assumed causes of climate change out of four items subtracted from the number of correct assumed causes out of five items) predicted a 5-item measure of climate protective behavioural intentions (B = .14, scale range 5-25) and a 7-item measure of intentions to vote on hypothetical referenda to enact government policies to reduce CO_2 emissions (B = .22, scale range 7-28, in regression analyses including several other relevant predictor variables).

Similarly, in a study by Bord, O'Connor, and Fisher (2000) with N = 1,218 adults in the United States, the number of correct assumed causes of climate change out of five items predicted the same measures of climate protective behavioural intentions (β = .14) and voting intentions for government policies (β = .26, in regression analyses including several other relevant predictor variables). Unfortunately, the authors do not report the results of scale analyses of their intention measures in either study.

In a mail survey with N = 623 residents of the United States by O'Connor, Bord, Yarnal, and Wiefek (2002), the number of correct assumed causes of climate change out of five items predicted a 4-item measure of voting intentions for climate-protective government policies (B = 0.16, scale range 4-16) and three scales on climate protective behavioural intentions with six items on green purchasing (B = .27), three items on reducing thermostat use (B = .22), and three items on reducing driving (B = .14; the scaling for these measures is not clear).

Zahran, Brody, Grover, and Vedlitz (2006) conducted a telephone survey with N = 511 randomly selected adults in the United States. Their 2-item measure of climate change knowledge predicted an 11-item measure of climate policy support in a regression analysis including further relevant variables (β = .10).

In a computer-assisted telephone interview study with N = 833 adults in the United States, Park and Vedlitz (2013) found that their 4-item measure of climate change knowledge predicted an 8-item measure of climate protective policy support in a regression analysis including further relevant variables (regression coefficient = 0.12; it is not specified whether this is an unstandardised or standardised coefficient). The authors also state that it predicted an 8-item self-reported measure of climate protective behaviours. However, the regression coefficient of 0.06 does not seem to be significant (see table on p. 231).

In their randomly selected sample of $N = 1{,}065$ residents of Switzerland, Shi, Visschers, and Siegrist (2015) examined the relations between different types of climate change knowledge (seven items on physical knowledge regarding CO_2 and the greenhouse effect, seven items on climate change and its causes, eight items on expected consequences of climate change, and eight items on action-related knowledge) and the willingness to perform 11 behaviours for climate mitigation and the acceptance of nine climate-friendly policies. In their regression models including further relevant variables, neither physical nor causal knowledge predicted willingness to change behaviour. Action-related knowledge was a positive predictor ($\beta = .08$), while knowledge of consequences was a negative predictor ($\beta = -.08$). Physical, consequence-related, and action-related knowledge did not predict the acceptance of climate-friendly policies, while causal knowledge did ($\beta = .08$). Moreover, they found indirect relations between causal knowledge and both outcomes via climate change concern.

Dijkstra and Goedhart (2012) found no relation between their 12-item measure of climate change knowledge and a self-report measure consisting of eight proenvironmental behaviours in a study with $N = 671$ pupils in France, Italy, Spain, Norway, and the Netherlands.

Summarising the outlined results, research with adults in the United States found relations between 1-dimensional climate change knowledge measures and hypothetical behavioural engagement for climate protection, indicated by policy support (Bord et al., 2000; O'Connor et al., 1999; O'Connor et al., 2002; Park & Vedlitz, 2013; Zahran et al., 2006) and behavioural intentions (Bord et al., 2000; O'Connor et al., 1999; O'Connor et al., 2002). While research with school pupils in Europe did not find a relation between climate change knowledge and self-reported climate protective behaviours (Dijkstra & Goedhart, 2012), research on environmental knowledge as a 1-dimensional measure with adults in Europe and Latin America found relations with self-reported proenvironmental behaviours (Geiger et al., 2014; Kaiser & Frick, 2002).

Differentiating between knowledge dimensions, research with adults in Europe found that action-related and consequence-related knowledge of climate change predicted climate protective behaviours, while causal knowledge predicted policy support (Shi et al., 2015). Action-related and effectiveness environmental knowledge predicted proenvironmental behaviours directly, while system knowledge predicted them indirectly via the other two knowledge forms (Frick et al., 2004). Both system knowledge and action-related environmental knowledge predicted proenvironmental behaviours in a sample of Latin American adults (Díaz-Siefer et al., 2015). Among European school pupils, action-related knowledge, but not effectiveness and system environmental knowledge, was related to proenvironmental behaviours (Roczen et al., 2014). In my research, I will focus on comparing system knowledge (including knowledge about CO_2, climate change, and its causes and consequences) and climate protective behavioural knowledge (including knowledge about climate-impacting actions and their effectiveness) in order to reduce the complexity of the overall models. From the outlined evidence, I inferred that a relation between climate change knowledge and climate protective behaviour is likely. However, whether the relation will differ for climate system knowledge and climate protective behavioural knowledge still seems unclear. Therefore, I examined the following hypothesis and research question:

H5: Climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge is positively related to climate protective behaviour.

RQ1: Is the relation with climate protective behaviour different for climate system knowledge compared to climate protective behavioural knowledge?

Having outlined the evidence from prior studies and the hypotheses for my work on the communication strategy of proximising climate change, I will now describe the approach I used to investigate these hypotheses. In the following section, I define my theoretical conceptualisations and empirical operationalisations.

2.4 Proximising climate change in the current approach

2.4.1 Communicating socio-spatial proximity of climate change

In this subsection, I outline the design of the three studies I undertook to examine the communication strategy of proximising climate change in comparison to prior research. Before conducting experiments and investigating the causal impact of communicating proximity vs. distance, I conducted a correlational study (see Study 1, Chapter 4). Here, I sought to test a path model reflecting the assumed process by which a *perceived* *communicated socio-spatial distance of climate change in news coverage* might predict people's climate protective behaviour and climate change knowledge (i.e., through higher psychological socio-spatial distance of climate change and a reduced relevance attributed to the issue). I assessed perceived communicated socio-spatial distance with two items, one addressing social, the other spatial distance (see Chapter 4.2.3.1).

Then, in two experiments (see Study 2, Chapter 5, and Study 3, Chapter 6), I varied the communicated socio-spatial proximity vs. distance of climate change in a news text (see Chapters 5.2.3 and 6.2.3.2). Here, I sought to test path models reflecting the assumed process by which the communication of socio-spatial proximity vs. distance of climate change in a news text might influence climate protective behaviour and climate change knowledge (i.e., by reducing people's psychological socio-spatial distance of climate change and increasing the relevance they attribute to the news text about the issue). Both studies included a no-message control condition (like Hart & Nisbet, 2012; Scannell & Gifford, 2013; Schoenefeld & McCauley, 2016) in order to additionally examine the effect of news exposure per se on the outcomes. The contents of the news texts referred to existing science communication about climate change such as the IPCC report (see Schoenefeld & McCauley, 2016; Spence & Pidgeon, 2010). Similar to Scannell and Gifford (2013), I included behavioural recommendations for climate protection in the articles in order to examine not only climate system knowledge but also climate protective behavioural knowledge. Study 2 involved German participants and varied whether the effects of climate change were communicated as affecting Germany vs. the world on a global scale (Brügger et al., 2016; Scannell & Gifford, 2013) and specifically developing countries. Study 3 involved UK participants and varied whether the effects were communicated as affecting the UK vs. Bangladesh as a distant country (Jones et al., 2017; Spence & Pidgeon, 2010).

Concerning the design of the stimulus material, the outlined prior studies used written materials, described as information material (Brügger et al., 2016; Shwom et al., 2008; Spence & Pidgeon, 2010), a poster (Scannell & Gifford, 2013), or videos (Jones et al., 2017; Wiest et al., 2015). As classic news media are still the central means of communicating climate change to the public (Brüggemann et al., 2018), my work concerns communication and proximising climate change in these media. Thus, I designed the stimulus material in the style of news articles (like Hart & Nisbet, 2012) in order to increase the external validity with respect to a news reception situation. As a further means of establishing external validity, I included a picture in the typical style of a news text. The picture differed between conditions (Spence & Pidgeon, 2010) as compared to keeping the pictures constant (Hart & Nisbet, 2012) and was therefore part of the experimental manipulation.

Again with the aim of maximising the external validity of the studies with respect to the news reception context, I decided 1) not to specifically ask participants to pay close attention to the article and inform them that questions on it will follow, as was done in the study by Spence and Pidgeon (2010); 2) not to increase the potential effect of the proximity vs. distance manipulation through measures such as asking participants to write down a further either local or global impact, as was done in the study by Scannell and Gifford (2013) or ask questions repeating condition-specific information, as was done by Brügger et al. (2016). Unlike Scannell and Gifford (2013), I also decided not to exaggerate the expected effects of climate change but to stick to the actual scientific publications.

I assessed psychological distance not as a manipulation check (Brügger et al., 2016) but as a theorised outcome and mediator of communication effects (Jones et al., 2017). In addition, I included *perceived communicated distance of climate change in the news coverage* as a direct manipulation check.

In Study 2, I studied a sample of students (like in Brügger et al., 2016, Study 1; Spence & Pidgeon, 2010). However, in contrast to these studies, I intentionally did not include students of the social sciences who might be too familiar with similar experimental research. Study 3 was conducted with a sample of the general public in the UK (like in Brügger et al., 2016, Study 2).

2.4.2 Psychological socio-spatial distance of climate change

Conceptualisation. In this work, I conceptualise psychological distance on the basis of CLT (Trope & Liberman, 2010) and its application to the climate change phenomenon (Spence et al., 2012). Therefore, I differentiate among four dimensions. *Psychological spatial distance* refers to the extent to which people perceive climate change as mostly affecting distant locations. *Psychological social distance* refers to the extent to which people perceive climate change as mostly affecting other people. Spatial distance and social distance are related in the sense that people in distant places are others. *Psychological temporal distance* refers to the extent to which people perceive climate change effects as mostly occurring in the future. *Psychological hypothetical distance* refers to people's uncertainty regarding the climate change phenomenon. Psychological spatial and social distance are the focus of my research as they are addressed by the strategy of proximising climate change through communication about expected local consequences. I assumed that the two dimensions are related and form part of the overall concept of psychological distance. The main variable I use in my argumentation and later in my analyses is thus *psychological socio-spatial distance*.

Intuitively, the term psychological distance also evokes an association with emotional distance (e.g., Leviston, Price, & Bishop, 2014). An issue that is psychologically close might be more emotionally involving, while a distant issue might be experienced as more emotionally neutral. However, emotional distance is not part of the conceptualisation of psychological distance in CLT and therefore not part of my theoretical framework.

Operationalisation. In classic research on CLT, psychological distance is usually not explicitly measured. Rather, the distance of objects or events is varied and effects on various outcomes are assessed (Trope & Liberman, 2010). These effects are then interpreted as being caused by individuals' perception of the object's or event's distance, hence, their psychological distance. Sometimes, studies include measures of psychological distance as a manipulation check.

Research on the psychological distance of the climate change phenomenon, however, tries to measure individuals' psychological distance with survey instruments (see Chapter 2.3.2 for details). They sometimes include items on psychological proximity which are reverse-coded to reflect psychological distance. To my knowledge, the first instrument for this construct was developed by Spence et al. (2012) with one item on temporal distance, two items each on spatial distance and social distance, and five items on hypothetical distance. Carmi and Kimhi (2015) used a 3-item index including one item each for social, temporal, and hypothetical distance. Similarly, Sacchi et al. (2016) used a 3-item index including one item each for spatial, temporal, and hypothetical distance. Brügger et al. (2016) measured psychological distance with five items, one general and one for each of the four dimensions. Jones et al. (2017) developed and tested 26 items with a factor analysis and proposed a scale with four items for temporal and spatial distance, two items for social distance, and six items for hypothetical distance. In Study 1 and 2, I measured psychological distance with a refined scale based on the approaches by Spence et al. (2012) and Jones et al. (2017; see Chapters 4.2.3.2, 5.2.4.1) and further improved the scale in Study 3 (see Chapter, 6.2.4.1).

2.4.3 Relevance attributed to the climate change issue

Conceptualisation. Issue relevance or the relevance attributed to news about an issue is not a uniformly applied concept or term (for an overview, see Weber & Wirth, 2013). Other related terms include issue importance, perceived salience, informational utility, or the newsworthiness of a piece of media content for an individual (Kim, 2008; Knobloch et al., 2002; Wirth, 2006). These concepts are 1-dimensional. Moreover, relevance attributions are also part of the broader concept of involvement (Wirth, 2006), which can be applied to issues reported in the news. Three origins of involvement regarding an issue and corresponding types of relevance attributions have been identified: 1) value relevance (i.e., the issue is related to important values of the individual), 2) outcome relevance (i.e., the issue has consequences for the individual), 3) impression relevance (i.e., the issue has an influence on how the individual is perceived by others). In an alternative categorisation of different types of relevance that makes reference to the relevance theory proposed by Schütz (1982), Weber and Wirth (2013) describe how five kinds of news are considered relevant in different ways due to different news characteristics: 1) unfamiliar or unexpected news has imposed thematic relevance, 2) news that matches the recipients' interest has voluntary thematic relevance, 3) news that helps recipients interpret a problem of interest has interpretational relevance, 4) news that informs recipients' goals or plans has motivational relevance, and 5) news with possible impacts in the future has hypothetical relevance.

In my approach, I am interested in the mere attribution of relevance to the climate change issue and corresponding news coverage. I do not differentiate among different types of relevance attribution or causes of these attributions. Rather, I study communicated proximity vs. distance as one possible news characteristic that might influence relevance attribution. While I assessed the personal and societal relevance of the climate change issue in Study 1 in order to examine whether these differed in their relation to the other variables of interest, I eliminated this differentiation in Studies 2 and 3, following Weber and Wirth's (2013) argument that a general conceptualisation of relevance integrates several levels of relevance in a pattern of intersubjectively similar attributions of personal *or* societal relevance (p. 524). In the experimental Studies 2 and 3, I assessed the relevance attributed to the news text received on the climate change issue.

It is important to emphasise that I regard issue relevance as conceptually distinct from psychological distance. Later in my line of argument, I will discuss that even if climate change consequences are regarded as affecting mostly other people in distant places, this does not necessarily imply their irrelevance (see Chapter 2.5). However, it will be necessary to empirically test this conceptual distinctness by examining the strength of the correlation between the two constructs (i.e., a weak correlation would speak in favour of discriminant construct validity).

Operationalisation. The relevance attributed to news issues has often been measured with single items (Weber & Wirth, 2013; see e.g., Kim, 2008). The operationalisation I used (see Chapters 4.2.3.3, 5.2.4.2, 6.2.4.2) was adapted from Spence and Pidgeon (2010) as well as Weber and Wirth (2013), who employed several items to increase reliability. Spence and Pidgeon (2010) assessed the relevance attributed to information received on climate change with four items that asked how interesting, involving, personally relevant, and pertinent participants found the information (Cronbach's $\alpha = .81$). Weber and Wirth (2013) used three semantic differentials (i.e., unimportant – important, meaningless – meaningful, irrelevant – relevant) in their four experiments ($.89 \leq \alpha \leq .95$).

2.4.4 Climate protective behaviour

Conceptualisation. The concept of climate protective behaviour can be embedded in more traditional psychological research by being conceptualised as *proenvironmental behaviour*. The term proenvironmental behaviour (or engagement or action) seems to be the most frequently used (e.g., in the following reviews, Bamberg & Möser, 2007; Kormos & Gifford, 2014; Osbaldiston & Schott, 2012; Steg & Vlek, 2009). However, the terms conservation behaviour (e.g., Arnocky, Stroink, & DeCicco, 2007), ecological behaviour (e.g., Kaiser & Wilson, 2000), environmentally significant behaviour (e.g., Gatersleben, Steg, & Vlek, 2002; Stern, 2000), and green behaviour (e.g., Amel, Manning, & Scott, 2009) usually refer to the same idea. The concept of sustainable behaviour sometimes covers only proenvironmental behaviour and sometimes goes beyond it to include the social or even economic dimensions of the sustainability concept (see Chapter 2.1; e.g., Tapia-Fonllem, Corral-Verdugo, Fraijo-Sing, & Durón-Ramos, 2013; Webb, Mohr, & Harris, 2008).

Proenvironmental behaviour can be defined as "actions which contribute towards environmental preservation and/or conservation" (Axelrod & Lehman, 1993, p. 153). In an often cited definition, Stern (2000) referred to environmentally significant behaviour more broadly and not restricted to environmental conservation. However, he noted that the focus of psychological research has turned towards behaviours that protect the environment. He outlined that environmentally significant behaviour can be defined, on the one hand, by its *impact* (i.e., “it changes the availability of materials or energy from the environment or alters the structure and dynamics of ecosystems or the biosphere itself”, p. 408). Some behaviours cause these changes directly or proximally (e.g., waste disposal), others indirectly (e.g., support for environmental policies). On the other hand, environmentally significant behaviour can be defined by its *intent* (i.e., it is intended to change, usually to benefit, the environment). This intent-oriented definition “highlights the possibility that environmental intent may fail to result in environmental impact” (p. 408). Stern (2000) further differentiated between four types of environmentally significant behaviours: activist behaviour in the public sphere (e.g., participation in environmental organisations or demonstrations, signing petitions), non-activist behaviour in the public sphere (e.g., policy support, willingness to pay taxes for environmental protection), behaviours in the private sphere (e.g., product purchases, use and disposal, travel mode choices, energy use), and behaviours within organisations (e.g., workplace behaviour or job decisions that promote environmental protection).

Apart from differentiating types of proenvironmental behaviours according to their societal function, it is also common to directly differentiate between domains such as mobility, energy use, food consumption, or recycling. Studies in environmental psychology often address behaviours in one of these domains (for an overview, see Gatersleben et al., 2002). However, the question arises whether these behavioural domains really share a common underlying motivation to behave in a proenvironmental manner. Kaiser and Wilson (2000) argued that attempts to measure general proenvironmental behaviour across diverse domains have often resulted in multidimensional models because situational influences resulting in different behaviour difficulties were neglected (e.g., in addition to proenvironmental motivation, the availability and quality of public transport or a recycling system determine the extent of its usage). Such behaviour difficulties arising from situational influences can be considered in a probabilistic measurement approach. Kaiser and colleagues thus developed a general and flexible measure of proenvironmental behaviour that encompasses several domains and can be adapted to the research context (for details, see Kaiser, Byrka, & Hartig, 2010).

In addition to proenvironmental behaviour, climate protective behaviour has also been conceptualised as *prosocial behaviour* (or altruistic or selfless behaviour; see e.g., Neaman, Otto, & Vinokur, 2018). In this regard, it is studied within the tradition of social dilemma research (Hauser, Rand, Peysakhovich, & Nowak, 2014; Kortenkamp & Moore, 2006; Milinski, Semmann, Krambeck, & Marotzke, 2006; Milinski, Sommerfeld, Krambeck, Reed, & Marotzke, 2008; Tavoni, Dannenberg, Kallis, & Löschel, 2011; van Vugt, 2009).

In my work, I understand and investigate *climate protective behaviour* more in the tradition of proenvironmental behaviour research as actions that contribute to climate protection. These comprise people's lifestyle in the private sphere (e.g., with respect to resource consumption and behaviours that determine one's carbon footprint). Here, I examined behaviour in the domains of transport use, energy use, and resource use. Moreover, they comprise activist or non-activist actions in the public sphere in the form of social or political actions (e.g., taking part in campaigns, policy support). Hence, I included behaviours in several domains and adopted Kaiser and colleagues' idea of a general underlying motivation.

Operationalisation. Operationalisations of climate protective behaviour can be classified by whether they involve self-reported behaviour or observed behaviour. Self-report measures of behaviour simply ask people what they do. Typically, respondents indicate how often they perform each of a set of behaviours. The set refers to either one or several behavioural domains (for an overview, see Gatersleben et al., 2002). In Study 1 (see Chapter 4.2.3.5), I used the General Ecological Behaviour (GEB) scale (Kaiser, 1998; Kaiser & Wilson, 2000, 2004), which is an established and validated measure. It has been proposed as a variable instrument that is not restricted to a particular set of ecological behaviours. The idea is to assess a set of manifest behaviours out of a behaviour class that reflects one's latent motivation to protect the environment. These manifest behaviours can refer to different behavioural domains (e.g., waste avoidance, recycling, travel mode choice, consumption, energy conservation, vicarious social behaviours toward conservation). The scale can thus be adapted to the specific context or research interest. Applying it to my research interest, I included behaviours with an impact on climate change in the domains of transport use, energy use, resource use/consumption, and political/social action. The authors usually use 30 to 65 items. The mathematical foundation of the scale is the probabilistic Rasch model (Bond & Fox, 2007), which estimates person parameters (i.e., people's general ecological motivation) and item parameters (i.e., difficulties of single behaviours). Kaiser and Wilson (2004) reviewed earlier studies on the GEB scale and reported that the Rasch model-based person separation reliability coefficients ranged from R_p= .71 to .88, Cronbach's alphas from α = .72 to .88, and test-retest reliability from r_{TT} = .76 to .83 (p. 1534). In an indication of the criterion validity of the GEB scale, Kaiser (1998) found negative relations with self-reported annual kilometres per car and airplane and a positive relation with one's hypothetical financial contribution to an environmental organisation. Kaiser, Frick, and Stoll-Kleemann (2001) provided evidence that self-reports of behaviour on the GEB scale represent valid indicators of observed ecological behaviour. Moreover, using data from a life cycle assessment, Kaiser, Doka, Hofstetter, and Ranney (2003) showed that behaviours assessed in the GEB scale exert a meaningful environmental impact. Arnold, Kibbe, Hartig, and Kaiser (2017) found that the GEB scale was negatively correlated with household electricity consumption assessed via self-report and smart meter or reported by the power company. Applying a known-groups approach, Kaiser (1998) found that members of a transportation association representing car drivers' interests scored lower on the GEB scale than members of an association promoting a sustainable transport system. Furthermore, customers of a green electricity program scored higher on the GEB scale and consumed one third less electricity compared to regular consumers (Arnold et al., 2017).

In Study 3 (see Chapter 6.2.4.4), I included a measure of *climate protective behavioural intentions* (also referred to as preparedness or willingness to act). Behavioural intentions are often used to study the effects of interventions in situations where behaviour cannot be immediately observed and interpreted as behavioural indicators. However, strictly speaking they are, of course, distinct from actual behaviours. On the basis of the theory of planned behaviour (TPB, Ajzen, 1991), it is reasoned that intentions are important determinants of behaviour that mediate the impact of other psycho-social predictors such as attitudes, social norms, and perceived behavioural control. Accordingly, a meta-analysis by Bamberg and Möser (2007) found a mean correlation of r = .52 (15 studies) between proenvironmental behavioural intentions and behaviour. An older meta-analysis by Hines et al. (1987) found a mean correlation of r = .49 (six studies). I inferred the behavioural intention measure from the GEB scale (Kaiser & Wilson, 2000).

Self-reported behaviour measures are the preferred method of data collection for a majority of researchers due to their low costs, ease of use, and flexibility. Moreover, they allow otherwise unobservable behaviour to be investigated. A meta-analysis on the reliability of self-reported proenvironmental behaviour involving 19 measures assessed in 15 studies found a medium to large correlation of $r = .46$ with observational measures (Kormos & Gifford, 2014). Nevertheless, a relevant portion of the variance in actual observed behaviour remains unexplained by self-reports. Therefore, the need to complement self-reported measures with observational measures has been expressed.

Several observational measures have been used to assess proenvironmental behaviour in field experiments. Some of them are indirect indicators of behaviour such as meter reading of a household's energy use, while others try to directly infer behaviour, for example, by observing the content of trash bins (for an overview, see Osbaldiston & Schott, 2012). Moreover, approaches have been developed to observe proenvironmental or prosocial behaviour in the laboratory, such as material use (e.g., Ahn et al., 2015; Longoni, Gollwitzer, & Oettingen, 2014), consumer choices (e.g., Griskevicius, Tybur, & van den Bergh, 2010; Schmitt, Schneider, Weinmann, & Roth, 2017), or behaviour in resource dilemma games (e.g., Hauser et al., 2014; Kortenkamp & Moore, 2006). Some of these measures involve real behaviour such as choosing an ecological product instead of a conventional one (Schmitt et al., 2017), while others consist of hypothetical behaviour such as consumer choices in an online shopping scenario (Griskevicius et al., 2010).

For my research, I adapted two approaches from prior laboratory studies in order to use them in an online context. First, in Studies 2 and 3 (see Chapters 5.2.4.4 and 6.2.4.4), I assessed individuals' information behaviour regarding options for individual engagement for climate protection in the public and private spheres (Stern, 2000). This idea was based on a laboratory study by Pahl and Bauer (2013) in which the authors measured the time participants spent looking at environmental information materials and the number of brochures they collected. The reasoning is that devoting time to obtaining information about new behavioural options can be regarded as an indicator of behavioural engagement for climate protection. Second, in Study 2 (see Chapter 5.2.4.4), I assessed donations to a climate protection organisation, inspired by Reese, Proch, and Finn (2015). Donations are often used in experiments as indicators of proenvironmental or prosocial behaviour (e.g., Pavey, Greitemeyer, & Sparks, 2011; Rabinovich, Morton, Postmes, & Verplanken, 2009). They can be regarded as non-activist behaviour in the public sphere (Stern, 2000). Moreover, in Study 3, I observed hypothetical behaviour in a budget allocation task. I adapted this task from a study by Spence, Leygue, Bedwell, and O'Malley (2014) to the context of climate change. Hence, I asked participants to allocate a budget to various local initiatives, among them climate change-relevant initiatives (for details, see Chapter 6.2.4.4).

2.4.5 Climate change knowledge

Conceptualisation. Conceptualisations of climate change knowledge often refer to the broader concept of environmental knowledge. Therefore, before turning to climate change knowledge, I first introduce the theoretical conceptualisation of environmental knowledge that most informed my approach.

Knowledge is classically divided into declarative (or factual) and non-declarative (or procedural) knowledge. The latter refers to skills that transform factual knowledge into relevant action (Gruber, 2011). Based on this differentiation, Kaiser and Fuhrer (2003) suggested a conceptualisation of *environmental knowledge* that comprises factual knowledge, labelled 1) system knowledge (causes and consequences of environmental problems), as well as procedural knowledge, labelled 2) action knowledge (individual behaviours with an impact on a healthy environment), and 3) effectiveness knowledge (relative impact of these behaviours). Kaiser and Frick (2002) introduced a measure based on this classification scheme. However, in a follow-up publication, Frick et al. (2004) relabelled the procedural dimensions of their questionnaire as actually also declarative knowledge, as they addressed facts about actions and their effectiveness rather than assessing skills. They assume that system knowledge affects ecological behaviour through action-related and effectiveness knowledge. In more recent publications, Kaiser, Roczen, and Bogner (2008) as well as Roczen et al. (2014) discussed their conceptualisation within the framework of competence in environmental education. They argued that environmental knowledge forms the intellectual basis for an ecological lifestyle, while attitude towards nature forms the motivational basis. Moreover, they assumed that attitude towards nature promotes action-related and effectiveness knowledge.

Tobler, Visschers, and Siegrist (2012) developed a conceptualisation of *climate change knowledge* that comprises factual knowledge regarding the domains of 1) CO_2 and the greenhouse effect, 2) climate change and its causes, 3) expected consequences of climate change, and 4) climate change-related actions.

Based on these two approaches, I differentiated between 1) *climate system knowledge* on CO_2 and the greenhouse effect, climate change and its causes, and expected consequences of climate change, and 2) *climate protective behavioural knowledge* on climate change-related actions and the effectiveness of these climate-related actions.

Operationalisation. Kaiser and Frick (2002) provided a measure of *environmental knowledge* with 61 questions (19 on system knowledge, 21 on action-related knowledge, 21 on effectiveness knowledge; 47 had a multiple-choice format, 14 a true/false format). It was validated in a sample of N = 783 students and N = 44 lecturers in Switzerland. The measure was analysed on the basis of the multidimensional random coefficients multinomial logit (MRCML) model, which is a multidimensional extension of the Rasch model (Adams, Wilson, & Wang, 1997). However, their analysis did not reveal that the 3-dimensional model had a better model fit than a 1-dimensional model. They also assessed nine knowledge items from an alternative instrument in order to determine convergent construct validity (r = .43; corrected for measurement error, $r_{\text{corrected}}$= .69). Moreover, in a known-groups approach, they showed that scores for students and lecturers in environmental science were higher compared to other subjects. The Rasch model-based person separation reliability was R_p = .65, Cronbach's α = .75, which the authors regard as satisfactory.

In a follow-up study with N = 2,736 randomly sampled German-speaking adults in Switzerland, Frick et al. (2004) assessed 60 items (21 on system knowledge, 20 on action-related knowledge, 19 on effectiveness knowledge; 44 in multiple choice format, 16 in true/false format). Here, they found that the 3-dimensional model fit the data better than a 1-dimensional model. The Rasch model-based person separation reliabilities were R_p = .67 for system knowledge, R_p = .66 for action-related knowledge, R_p = .50 for effectiveness knowledge, and R_p =. 71 for the overall scale.

Roczen et al. (2014) conducted a survey study in German school classes with N = 1,907 pupils. Here, they assessed 90 items that were adapted from previous versions of the questionnaire and extended in order to specifically fit adolescents (38 on system knowledge, 23 on action-related knowledge, 29 on effectiveness knowledge; 64 in multiple choice format, 26 in true/false format). The Rasch model-based separation reliabilities were R_p = .78 for system knowledge, R_p = .76 for action-related knowledge, R_p = .77 for effectiveness knowledge. The scale was further adapted and validated in Spanish versions in Argentina and Colombia (Geiger et al., 2014) as well as Chile (Díaz-Siefer et al., 2015).

Many approaches have been taken to assess *climate change knowledge* (see Roser-Renouf & Nisbet, 2008, for an overview of early measures). It is often conceptualised as 1-dimensional and measured with factual knowledge questions (e.g., three items, McCright, 2010; 12 items, Dijkstra & Goedhart, 2012). Sometimes, however, measures seem to mix attitudes and knowledge (e.g., 9-item measure by Pfautsch & Gray, 2017). O'Connor et al. (1999) assessed whether participants were able to identify correct and bogus causes of climate change with five and four items, respectively, and built a score subtracting the number of identified inaccurate causes from the number of accurate ones. Another approach is to ask only one general question (i.e., "In your judgment, when people use the term global warming, what are they referring to?", Kahlor & Rosenthal, 2009, p. 394) and code the answers regarding knowledge complexity and accuracy. Furthermore, authors such as Milfont (2012) have assessed self-reported knowledge by asking participants how well-informed they considered themselves to be (see also Kellstedt, Zahran, & Vedlitz, 2008; Krosnick, Holbrook, Lowe, & Visser, 2006).

In addition, more extensive measures have been constructed. Wilson (2000) reported results for 76 multiple choice questions based on the IPCC report. However, he did not publish the items or psychometrically analyse the scale. Sundblad, Biel, and Gärling (2008) published a measure with 44 items in the form of true-false statements (8 items on climate state, 12 items on climate change causes, and 24 items on climate change consequences, with six on weather, 12 on glaciers, and six on health). However, they did not conduct a psychometric analysis either.

Tobler et al. (2012) developed a deeper measure of climate change knowledge. It was constructed in German and tested with a randomly selected sample of the German-speaking Swiss population using a mail survey (N = 916). The authors first reviewed existing literature and conducted interviews on public knowledge and misconceptions regarding climate change. They then formulated statements that were to be evaluated as "true", "false", or "don't know". The statements were based on the Fourth Assessment Report of the IPCC (2007). Eight climate scientists approved the statements. In formulating the items, it was their aim to achieve a "compromise between scientifically true, yet generally understandable, statements" (p. 194). Their original scale consisted of 41 items (19 correct and 22 incorrect statements): nine items on CO_2 and the greenhouse effect, 11 items on climate change and its causes, 11 items on expected consequences of climate change, and 10 items on action-related knowledge. They constructed Mokken scales for each knowledge domain out of the items varying in difficulty. A Mokken scale is a probabilistic version of a Guttman scale which, in contrast to a Rasch scale, is based on a nonparametric procedure (see van Schuur, 2003). It remains unclear why the authors preferred a Mokken scale to a Rasch scale. Their analyses resulted in Mokken scales with six items on CO_2 and the greenhouse effect, seven items on climate change and its causes, and six items on expected consequences of climate change. No satisfactory Mokken scale was found for action-related knowledge. Therefore, they used a mean score for further analyses. All knowledge domains were positively correlated.

The scale was further improved by Shi et al. (2015). Again, they conducted a mail survey among a randomly selected sample of the German-speaking Swiss population (N = 1,065). The scale included seven items on CO_2 and the greenhouse effect, seven items on climate change and its causes, eight items on expected consequences of climate change, and eight items on action-related knowledge. Their analyses resulted in Mokken scales with all seven items on CO_2 and the greenhouse effect, all seven items on climate change and its causes, six items on expected consequences of climate change, and six items on action-related knowledge.

I used this measure in a slightly adapted version, including items from Frick et al. (2004) and Kaiser and Frick (2002) in Study 1 (see Chapter 4.2.3.4). However, as I only differentiated conceptually between two inclusive types of knowledge, I constructed scales for climate system knowledge and climate protective behavioural knowledge, respectively. Beyond these two established knowledge scales, my research on knowledge acquired from a news stimulus required me to assess knowledge about the content presented in the stimulus material for Studies 2 and 3 (see e.g., Knobloch et al., 2002, or Trepte, Schmitt, & Dienlin, 2018, for similar approaches). I reasoned that true-false questions in the style of Tobler et al.'s (2012) measure might be too simple when recipients had been provided with the corresponding information immediately before the assessment. Therefore, I constructed open questions and multiple-choice questions. However, their contents were derived from and aligned with the theoretical dimensions and items by Tobler et al. (2012), Shi et al. (2015), Frick et al. (2004), and Kaiser and Frick (2002; see Chapters 5.2.4.3 and 6.2.4.3).

In the previous sections, I have outlined how my work aimed to extend prior research by clarifying the effect of communicating socio-spatial proximity vs. distance of climate change in news coverage on recipients' psychological socio-spatial distance of climate change. I argued that in addition to the need to explicitly assess psychological socio-spatial distance, it is worthwhile to also include a direct manipulation check of perceived communicated proximity vs. distance in news coverage in order to disentangle the two concepts. Moreover, I described how I sought to model the process behind possible effects of proximising climate change, which has rarely been explicitly addressed in prior research. Specifically, I suggested investigating whether communicating the socio-spatial proximity of climate change reduces the psychological socio-spatial distance of climate change, which in turn might increase the relevance attributed to the issue, which in turn might positively predict climate protective behaviour and climate change knowledge. As a second idea for disentangling the inconsistent results of prior research on proximising climate change, I reasoned that psychological socio-spatial distance of climate change may not result in irrelevance or reduce the relevance of the issue for everyone. I will outline this reasoning in the following section.

2.5 Global identity and climate change communication

As a second main theoretical argument of my work, I propose that psychological socio-spatial distance of climate change may not reduce the relevance of the issue for individuals who strongly identify with people in remote parts of the world. Rather, the relationship between the psychological socio-spatial distance of climate change and the relevance attributed to news portraying proximal vs. distant consequences of climate change might be moderated by the connectedness recipients experience with socially and spatially distant affected people. More specifically, I reasoned that the relationship might depend on individuals' *global identity*. By global identity, I mean a definition of the self as part of all humanity and concern and caring for the well-being of all humans (McFarland et al., 2012; Reese et al., 2015). Such a global identity might characterise people who are able to *bridge the psychological socio-spatial distance* of climate change and corresponding communication. Individuals with a strong global identity might consider psychologically distant challenges (i.e., effects of climate change for other people in remote parts of the world) to be equally or almost as relevant as psychologically proximal challenges (i.e., effects for themselves and their immediate community). In the following subsections, I describe the theoretical (Chapter 2.5.1) and empirical basis (Chapter 2.5.2) of this assumption.

2.5.1 Theoretical conceptualisation of global identity

Numerous similar concepts with different names can be found in the literature, such as global (social) identity (Buchan et al., 2011; Renger & Reese, 2017; Tu, Khare, & Zhang, 2012; Türken & Rudmin, 2013), global citizenship identification (Lindner, 2012; Reysen & Katzarska-Miller, 2013), global orientation (Chen et al., 2016), global belonging (Der-Karabetian, Cao, & Alfaro, 2014), global empathy (Bachen, Hernández-Ramos, & Raphael, 2012), global place attachment (Devine-Wright, Price, & Leviston, 2015), global prosociality (Leung et al., 2015), supranational identity (Bertolotti & Catellani, 2015), international identity (Coe & Neumann, 2011), universal orientation (Krämer et al., 2017), connectedness to humanity (Lee et al., 2015), common human identity (Reese, 2016), or identification with all humanity (McFarland, 2011; McFarland et al., 2012; McFarland, Brown, & Webb, 2013). In my work, I will use *global identity* as a comprehensive umbrella term.

Among the different conceptualisations of a global identity, the concept of *identification with all humanity* (IWAH) introduced by McFarland et al. (2012) and differentiated by Reese et al. (2015) appears most theoretically grounded and elaborated. McFarland et al. (2012) define global identity as the degree to which people identify with all humans and feel a deep concern for their well-being. The conceptualisation is based on the idea of a "Gemeinschaftsgefühl" (translated into English as social interest or corporate feeling) proposed by Alfred Adler (1927/1954), whose most mature form is a feeling of oneness with humanity. Moreover, the authors refer to the concept of "self-actualised individuals" proposed by Abraham Maslow (1954), which includes a general identification with human beings. Finally, their conceptualisation is strongly rooted in social identity theory (SIT, Tajfel & Turner, 1979) and its extension self-categorisation theory (SCT; Turner et al., 1987). These theories assume that people define a substantial part of who they are by their attachment to social groups (e.g., age group, family, profession, nation). The groups people identify with are denoted as *ingroups*, and the groups people distinguish themselves from as *outgroups*. When people categorise themselves into and identify with an ingroup, they perceive of themselves as part of this higher-order social unit. An extensive amount of research on SIT and SCT has found that the more people identify with a social group, the more commitment and concern they express and the more they behave in a way that benefits this group (Reese, 2016).

Turner et al. (1987) proposed three levels of self-categorisation and corresponding identity definitions that differ in their level of inclusion. On the lowest level, *personal identity* means a definition of the self through differences to members of one's own ingroups. On an intermediate level, *social identity* means a definition of the self through similarities to members of one's own ingroups and differences to outgroups. Finally, on a superordinate level, *identity as a human* means a definition of the self through similarities of all humans. Hence, a global identity can be regarded as an inclusive representation of the self as part of one ingroup encompassing all of humanity.

Even though SCT suggests the possibility of identity as a human, previous research has largely focussed on personal and social identity. Only recently has there been rising interest in studying identity processes on a global level (e.g., Lee et al., 2015; Reese & Kohlmann, 2014). Research on the common ingroup identity model (Gaertner & Dovidio, 2000) – an extension of SIT/SCT – has revealed that encouraging people of different groups to conceive of themselves as part of an inclusive, superordinate ingroup can foster cooperation, perceived similarity, positive affect, positive attitudes, and cooperative behaviour across original group boundaries (Dovidio, Gaertner, & Saguy, 2009). Therefore, McFarland et al. (2012) argued that "individuals who regard all humanity as one ingroup should be low in bias against groups whom others would regard as outgroups (other races, nationalities, religions). This lack of bias should be expressed in many ways, including lower prejudice, greater concern for the well-being of members of those others regard as outgroups, and equal valuation of the lives of all human beings" (p. 831). Accordingly, studies using the *Identification with All Humanity Scale* (see Chapter 2.6) have found that it predicted outcomes such as people's concern for human rights and humanitarian needs (McFarland et al., 2012, Studies 1 and 2), knowledge and knowledge acquisition of global humanitarian concern (Studies 8 and 9) as well as willingness to contribute to humanitarian relief (Study 10).

While McFarland et al. (2012) conceptualised IWAH as 1-dimensional, recent research analysing the factor structure of the IWAH scale suggested a more differentiated construct. Reese et al. (2015) provided evidence for a meaningful subdivision of IWAH into the dimensions of self-definition and self-investment. These dimensions are theoretically based on the unifying, hierarchical model of group identification by Leach et al. (2008). In this model, *self-definition* refers to "the mere self-categorization or the mere inclusion of the self in an ingroup" (Reese et al., 2015, p. 427). It includes the components homogeneity of the ingroup and self-stereotyping (i.e., similarity of the individual to the ingroup prototype). *Self-investment* means "a purposefully chosen categorization of the self and consequential investment into the group" (Reese et al., 2015, p. 428). It subsumes the components solidarity, satisfaction, and centrality associated with the ingroup. Reese et al. (2015) as well as Reysen and Hackett (2016) confirmed that the factorial structure of the IWAH scale corresponded to these two dimensions (see Chapter 2.6 for details).

McFarland et al. (2012) regarded IWAH as "a stable value rather than a temporary mood" (p. 838). Accordingly, they showed that their measure of trait IWAH tended to be relatively stable over a period of ten weeks (test-retest correlation of r = .69). In their sample of N = 166 students, 85% did not experience a change in their level of IWAH (Study 3, p. 840). However, SCT assumes that situational cues in the social context can trigger which part of people's social identity (e.g., their ingroup membership as a student or as a woman) is more salient, thus guiding perceptions and actions. Moreover, situational cues can determine which level of inclusion is salient and hence whether people's personal identity, social identity, or identity as a human becomes more relevant for perceptions and actions (Turner et al., 1987). In the language of SIT/SCT, *salience* means that a social category is at the top of one's mind or, in other words, that it is perceived as important in a certain situation. Social categories have to be salient to affect cognition and behaviour (Trepte & Loy, 2017).

As an example, Unsworth and Fielding (2014) conducted two experiments with N = 126 students and N = 736 participants from the general public in Australia in which they raised the salience of participants' political identity and assessed climate change-related cognitions. Participants in the salience condition were asked to reflect on their political party preference with several questions, compared to no reflection on political identity in the control group. For participants who identified as right-wing, the human contribution to climate change was perceived as lower and support for government action for climate protection declined when political identity was made salient compared to when it was not made salient. The salience of political identity did not affect participants who identified as left-wing.

Reysen and Hackett (2016) stated that "attempting to assess fixed stereotypical category characteristics as a permanent measure of identification with humanity goes against the notion of a fluid and dynamic self that is at the heart of self-categorisation theory" (p. 2). Thus, whether a global identity can be situationally influenced remains an open question. I am specifically interested whether this can be achieved by means of communication. Research has shown that media do indeed have the potential to make different aspects of their recipients' identities salient and that identity processes, in turn, can influence media effects (Trepte, 2006; Trepte & Loy, 2017). Hence, I reasoned that making global identity salient through communicative means might influence how individuals process climate change communication that concerns socially and spatially distant people. Before I further develop and explain this reasoning, however, I first describe in more detail how global identity is related to climate change.

2.5.2 Global identity and climate change

Batalha and Reynolds (2012) proposed that UN meetings on climate change should try to form groups of like-minded people or nations that establish a superordinate identity in order to promote coordinated negotiation and action. The broadest possible superordinate identity would be citizens of the Earth. Similarly, Reese (2016) argued that "one path towards finding a common ground for climate and conservation negotiations is the salience of a common human identity" (p. 522).

In my search for empirical evidence on this issue, I found four studies explicitly confirming a relation between a global identity and climate change-related cognitions and behaviours. First, Running (2013) analysed data from the World Values Survey (www.worldvaluessurvey.org) from 2005 to 2008, but with an unusual statistical approach. She dichotomised the question of how serious respondents considered global warming and the greenhouse effect to be for the world as a whole into either 1 (*very serious*) or 0 (*somewhat serious, not very serious, not serious at all*). She also dichotomised the question of whether respondents identified as world citizen as 1 (*strongly agree, agree*) or 0 (*disagree, strongly disagree*). Controlling for political ideology, educational attainment, age, and gender, she used multilevel logistic regression models and reported the findings as odds ratios. World citizenship increased the odds of considering global warming to be very serious by 1.23.

Second, in a study by Katzarska-Miller et al. (2012) with N = 157 psychology students in the United States, N = 100 members of the general public in Bulgaria, and N = 100 university students in India, their 6-item measure of global citizenship identification was correlated with a 2-item measure of concern for global warming (r_{US} = .20; r_{Bulgaria} = .40; r_{India} = .36; r_{overall} = .28).

Third, Barth et al. (2015) conducted an online study with N = 450 participants in Germany. They were presented with a newspaper article on climate change injustice and subsequently answered a questionnaire. The 4-item measure of global identity was correlated with collective action intentions on behalf of victims of climate change injustice (r = .23), solidarity with affected people (r = .31), anger at climate change injustice (r = .11), and collective efficacy to fight the injustice of climate change (r = .28). In a SEM, they found the assumed indirect relation between global identity and collective action intentions via solidarity. Moreover, they also found that global identity indirectly predicted the decision to donate to a non-governmental organisation devoted to reducing climate change injustice via solidarity. In a follow-up online study with N = 124 students in Germany, a 9-item IWAH measure was again correlated with collective action intentions (r = .28), solidarity with affected people (r = .41), anger at climate change injustice (r = .27), and collective efficacy to fight the injustice of climate change (r = .20). In a path model, they confirmed the indirect relation between global identity and collective action intentions via solidarity.

Fourth, Devine-Wright et al. (2015) conducted an online study on the related concept of place attachment and cognitions regarding climate change in a sample of N = 1,147 Australian citizens. They assessed participants' sense of belonging to the Earth/the whole world. Moreover, they assessed opinions about the existence and causes of climate change and categorised participants into four belief types (i.e., denying existence; unsure whether climate change is happening; believing that climate change is a natural fluctuation; believing that climate change is happening and caused by humans). People who believed that climate change is happening and induced by humans felt more attached to the whole world than people with the other three belief types.

In addition to these explicit relations with climate change perceptions and behaviour, prior research on global identity has revealed relations with diverse indicators of proenvironmental cognitions and behaviour. As climate protective behaviour can be understood as a form of proenvironmental behaviour (see Chapter 2.4.4), these results can be transferred to my research interest and regarded as potential indications of a similar relation. Below, I summarise the main findings of this research.

In a study with N = 726 undergraduate students in the United States by Reysen and Katzarska-Miller (2013), a 2-item index of global citizenship identification was related to a 2-item index measuring belief in environmental sustainability (r = .38 and β = .50 in a SEM including further relevant predictor and outcome variables). This correlation was replicated in a follow-up study with N = 1,201 undergraduate students (r = .31 and β = .42 in a SEM including further relevant predictor and outcome variables).

Reysen and Hackett (2016) found in an study with N = 239 students in the United States that the IWAH scale correlated with belief in environmental sustainability (r = .45), with a smaller correlation for the so-called SIT dimension, which corresponds to global self-definition (r = .19), than the Adler/Maslow dimension, which corresponds to global self-investment (r = .56). In a regression analysis including further relevant variables, only the Adler/Maslow dimension remained a significant predictor (β = .56).

Der-Karabetian et al. (2014) found in an online study with college students from the United States (N = 442), China (N = 516), and Taiwan (N = 164) that a 7-item measure of global belonging (i.e., feeling connected to people all over the world and identifying as a world citizen) correlated with self-reported environmentally sustainable behaviour (US: r = .37; China: r = .27, Taiwan: r = .44). It remained a significant predictor in the US and Taiwanese samples in a regression model including further relevant variables.

In a laboratory study with N = 324 undergraduate students in Canada, Lee et al. (2015) found that the 9-item IWAH measure correlated with measures of connectedness to nature (r = .44), proenvironmental attitudes (r = .14), and self-reported proenvironmental behaviour (r = .27).

Leung et al. (2015, Study 1) proposed a 3-dimensional concept of a cosmopolitan orientation, including the dimension of global prosociality. People characterised by global prosociality have "a sense of global justice in that they recognize local and foreign people alike as being equally human and [. . .] tend to advocate a prosocial orientation to promote benevolence and generosity among human beings regardless of nationalities" (p. 80). Their corresponding 5-item scale correlated with self-reported support for environmental movements, assessed online in a student sample in Singapore (N = 309; r = .25), a student sample in Australia (N = 99; r = .36), and a sample from the general public in the United States (N = 251; r = .50). It remained a significant predictor in all three samples in a regression model including further relevant variables. In an online follow-up study (Leung et al., 2015, Study 2) with N = 98 students in Singapore, the simple correlation did not reach significance. However, global prosociality again proved to be a significant predictor in their regression model that took into account further relevant variables.

Drawing on data from the World Values Survey Wave 5 (2005-2009) and Wave 6 (2010-2014), Rosenmann, Reese, and Cameron (2016) showed that the degree to which respondents regarded themselves as world citizens (4-point scale) predicted whether they were an active (B = 0.49, R^2 = .02) or nonactive (B = 0.32, R^2 = .02) member of an environmental organisation, their willingness to give money to environmental issues directly or through a tax increase (r = .20), and whether they supported environmental causes through demonstrations or donations (B = 0.28, R^2 = .01).

Renger and Reese (2017) conducted an online survey study with N = 469 participants from the general public in Germany. Their 4-item measure of global identity correlated with attitudes towards environmental protection (r = .35), past proenvironmental behaviour (r = .35), intentions to engage in proenvironmental activism (r = .40), and whether participants currently donated to a proenvironmental organisation (r = .25).

These studies unequivocally suggest that a stronger global identity is associated with proenvironmental cognitions and behaviours. For my research, this implies that a similar relation can be expected between global identity and climate protective behaviour, as climate protective behaviour can be conceptualised as a form of proenvironmental behaviour. In addition to being an environmental issue, global climate change has often been characterised as a global social dilemma (see Chapter 2.4.4). Therefore, a laboratory study by Buchan et al. (2011) is also relevant with regard to my research interest. They conducted a study on global cooperation with a quota sample in terms of age, gender, and socioeconomic status with N = 1,195 participants from the general population of six countries (the United States, Italy, Argentina, South Africa, Russia, Iran). In a public goods dilemma, participants had to decide how much resources to allocate to a personal account, a local account, and a world account. Their 3-item measure of global social identity correlated with respondents' contribution to the world account (r = .20) and remained a significant predictor after controlling for several relevant variables.

Reese and Kohlmann (2014) conducted a further laboratory study on global social behaviour in the form of fair trade consumption with N = 68 university students in

Germany. Their 5-item measure of global identification predicted whether participants chose a small fair trade chocolate bar instead of a large conventional chocolate bar as compensation for participating (R^2 = .08). The relation was partially mediated by perceived global injustice.

Reese, Proch, and Cohrs (2014) assessed five items on global identification and a 7-item measure on attitudes (e.g., "It is reasonable to purchase fair trade products") and behavioural intentions (e.g., "I would adjust my standard of living substantially if I could thereby contribute to global justice") in favour of global equality. They found a positive relation between the two measures (r = .48), which were assessed in a sample of N = 117 university students in Germany during lectures.

Similarly, Reese et al. (2015, Study 2) found a relation between this attitudinal-behavioural measure and the IWAH scale (r = .56), assessed in a sample of N = 229 university students in Germany during a lecture.

With respect to issue relevance, IWAH has been related to globalism as operationalised by the importance assigned to five humanitarian foreign policy goals (rs = .26 and .30) and the importance attributed to universal human rights above national goals (rs = .26 and .32) in paper-based studies with N = 200 students and N = 218 adults from the general public in the United States (McFarland et al., 2012, Studies 1 and 2). As a behavioural outcome, it predicted hypothetical willingness to donate to humanitarian charities in an online study with N = 3,033 participants from the general public (Study 10). The relation between IWAH and knowledge was investigated in Study 8 with N = 79 students in the United States during classes. The authors found that their 16-item measure of global humanitarian knowledge (e.g., genocide in Darfur, AIDS in sub-Saharan Africa, efforts to end global hunger) was correlated with IWAH (r = .26) and predicted by it in a regression analysis also including other relevant variables (β = .23). As one means of knowledge acquisition with respect to specific issues, people engage in selective exposure to information in accordance with their attitudes about what is important (Holbrook, Berent, Krosnick, Visser, & Boninger, 2005). Selective exposure to media content of global prosocial concern was examined in US samples with N = 139 university students in classes and N = 196 adults related to these students (McFarland et al., 2012, Study 9). Participants were presented a list of 16 article teasers from a fictitious journal and asked to select the five they would most want to read and rank them according to their preference. Four articles were related to humanitarian concerns (i.e., poverty, human rights, genocide, the

AIDS pandemic). A target article received a score of 5 if it was selected as a respondent's first choice, a score of 4 if it was a respondent's second choice, and so on. These scores were summed up, with final scores ranging from 0 to 14. IWAH was positively correlated with selecting humanitarian articles in both samples (r = .46 and .39) and predicted selective exposure above and beyond other relevant variables (β = .44 and .29). These results indicate that global identity is related to the relevance attributed to media content of global concern.

The outlined examples of prior research can be transferred to climate protective cognitions and behaviours by conceptualising these cognitions and behaviours as proenvironmental and prosocial. Therefore, I interpreted these findings as indications that a global identity might play a role in climate protection, too. Specifically, I assumed that global identity predicts the relevance attributed to the climate change issue (inferred from Katzarska-Miller et al., 2012; McFarland et al., 2012, Studies 1, 2, 9; Running, 2013), climate change knowledge (inferred from McFarland et al., 2012, Study 8), and climate protective behaviour (inferred from Barth et al., 2015; Buchan et al., 2011; Der-Karabetian et al., 2014; Lee et al., 2015; Leung et al., 2015; McFarland et al., 2012; Reese et al., 2014; Reese et al., 2015; Reese & Kohlmann, 2014; Renger & Reese, 2017; Rosenmann et al., 2016; see Figure 6).

H6: Individuals' global identity as a trait predicts a) the relevance attributed to the climate change issue, b) climate protective behaviour, and c) climate change knowledge.

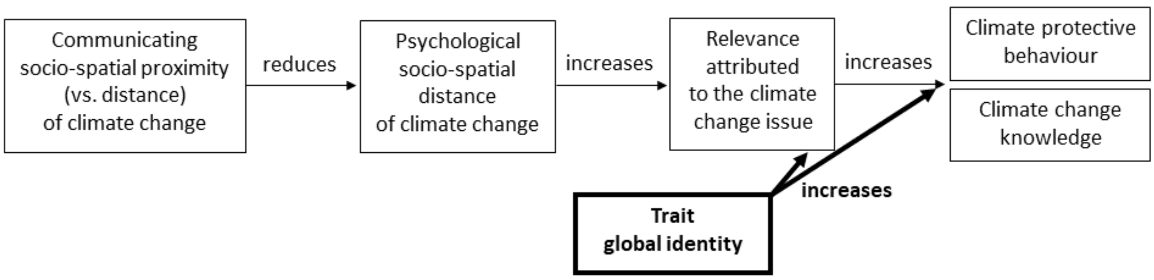


Figure 6. Assumed impact of global identity as a trait.

It should be noted that no causal inferences can be drawn from the outlined correlational results yet. Hence, it remains unclear whether a global identity has the potential to induce proenvironmental or prosocial behaviour change and motivate knowledge acquisition. Moreover, the outlined studies conceptualised and investigated global identity as a trait and did not make attempts to increase it or address situational differences in the salience of a global identity.

2.5.3 Situational salience of global identity

Reviewing the existing research on the various constructs related to global identity, I found one experiment in which the degree of global identity conceptualised as IWAH was manipulated with the goal of examining its causal influences on global prosocial behaviour (Reese et al., 2015). It was a laboratory experiment with N = 80 students in Luxembourg who were assigned to three conditions. The manipulation consisted of colour-printed posters that were attached to the wall of the laboratory. The first poster depicted hands and arms of people of varying ethnic backgrounds reaching for a globe. The authors argued “that this poster may increase identification with all humanity because it suggests—due to the varying ethnic actors—that the world could only be carried by all its humans” (p. 435). The second poster consisted of a match table for the football World Cup with flags of various international teams. Here, the authors assumed “that a depiction of a collection of flags could induce a diverse, multinational representation of the world, and thereby increase identification with all humanity” (p. 435). In the control condition, no poster was attached to the wall. Both poster conditions were collapsed into one experimental group. Regarding the two dimensions of IWAH, the results revealed no difference in global self-definition but higher global self-investment in the experimental group compared to the control group (Cohen’s d = 0.41). Moreover, participants in the experimental group donated more money to a local (d = 0.43) and a global charity (d = 0.50). The authors report that the poster condition indirectly predicted more donations to the global charity via global self-investment. The relevant implication of this study for my own approach is the finding that IWAH does indeed seem to be situationally variable or, in the language of SIT, can be made situationally salient by relevant cues. However, it is important to note that only one of the two dimensions, namely self-investment, was influenced by the experimental manipulation.

Tu et al. (2012, Study 6) conducted an experiment on local and global product preferences with N = 87 undergraduate students in the United States. The relevant aspect of this study for my research is that they tried to increase the salience of global vs. local identity with a priming procedure. Participants were assigned to two conditions. In a sentence-scrambling task, they completed 15 sentences related to either a global identity (e.g., “events know I global”) or local identity (e.g., “events know I local”). Momentarily accessible global/local identity was measured with two items on a 7-point Likert scale: “At this moment, I mainly identify myself as a global/local citizen” and “At this moment, I feel I am a global/local citizen”. The authors subtracted the average of the local items from the average of the global items. Hence, higher values indicated a relatively more accessible global identity. They found that global identity was relatively more accessible in the global condition (M = -.11) than in the local condition (M = -1.52, p < .05). It is further stated that this measure of primed identity was not related to an 8-item trait local-global identity measure assessed at the end of the study. However, the analysis leading to this conclusion is not clear to me. The important implication of this study is that it appears possible to experimentally influence the situational salience of global/local identity.

A third study relevant for my research interest is an online experiment examining the effects of a video depicting the unity of humankind on several outcomes, including universal orientation, a concept similar to the idea of a global identity (Krämer et al., 2017). Here, N = 749 German- and English-speaking participants were assigned to 12 groups applying a 4 (content of the videos: beauty of the earth, unity of humankind, acts of human kindness, funny videos as a control) × 3 (media context: YouTube video with a high number of views, YouTube video with a low number of views, unknown video platform) between-subjects design. The two videos sought to depict the unity of humankind included a video of a man dancing in various places around the world with locals (“Where the hell is Matt?”) as well as a movie trailer of people around the world and their everyday lives (“Life in a Day”). The control videos included a video of news bloopers and a video of funny animals. The authors found a difference in universal orientation between participants who watched the videos on the unity of humankind and those who watched the control videos. I contacted the authors and they provided me with the result that this difference also held when comparing only the Matt video with the control videos (d = 0.25 and d = 0.36). The relevant implication of this study is the finding that communicative means in the form of a video stimulus could increase individuals' level of universal orientation, a concept similar to global identity as conceptualised by IWAH.

The Matt video was also used in two bachelor’s theses I am aware of. Even though their results have to be treated with caution as not all relevant information is completely reported, they served to inspire my approach and are therefore briefly outlined. The first thesis at Cornell University used this video to induce a perception of connectedness in order to examine its influence on altruism and prosocial behaviour (Kirsner, 2011). In a first laboratory experiment, N = 93 students were assigned to four conditions (connectedness video: Matt dancing with others, control video: Matt dancing alone, connectedness story, control story). There were no differences between groups in answers to an item on connectedness to others, which was assessed in a mood questionnaire as manipulation check. A second manipulation check asked participants with open questions about their impression of the movie, how it made them feel, and how they would describe it to a friend. In the connectedness video condition, 38.1% of participants mentioned feeling connected, compared to 8.7% in the control condition. In a second laboratory experiment, N = 58 students were assigned to four conditions in a 2 (video: connectedness, control) × 2 (person needing help: ingroup member, outgroup member) between-subject design. Unfortunately, results on the connectedness item are not reported, but again, more participants in the connectedness condition mentioned connectedness compared to the control condition.

The second thesis at the University of Hohenheim also used the Matt video to medially prime a feeling of connectedness in order to examine its influence on prosocial behaviour (Kitzmann, 2015). In an online experiment conducted in Germany, N = 191 participants were assigned to three video conditions (connectedness: Matt dancing with others, autonomy: Matt dancing alone, control: underwater world with fish). A manipulation check item based on Pavey et al. (2011) was embedded in several questions referring to the video: "The video reminded me of times when I felt close and connected to others". Participants in the connectedness condition reported stronger connectedness memories than participants in the autonomy condition (d = 0.47) and the control condition (d = 0.52). The implication of these two theses is that a feeling of connectedness can be evoked by a video of a man dancing with people all over the world. A feeling of connectedness can be seen as part of global identity (i.e., being part of the interconnected ingroup of all humanity).

On the basis of these results on the possible situational variability of global identity and the relation between global identity and proenvironmental and prosocial outcomes outlined in Chapter 2.5.2, I assumed (see Figure 7):

H7: Making global identity salient increases a) the relevance attributed to the climate change issue, b) climate protective behaviour, and c) climate change knowledge.

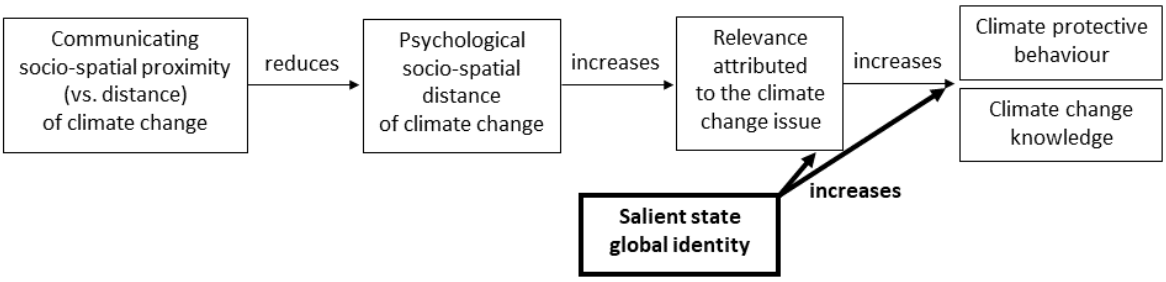


Figure 7. Assumed impact of global identity salience.

2.5.4 Global identity and psychological socio-spatial distance

Brügger, Dessai et al. (2015) have recently argued that CLT does not necessarily imply simple main effects of psychological distance. Rather, psychological distance "influences what information people preferentially attend to when they think about (that is, construe) an object or event, and when they make decisions in relation to these" (p. 1032). For example, people tend to evaluate distant events more in line with their core values than closer events (Ledgerwood et al., 2010). Hence, individuals' values can moderate the effect of distance on their evaluation.

I propose that individuals' global identity might be such a moderator of the relation between the psychological socio-spatial distance of climate change and the relevance attributed to the phenomenon and corresponding communication. People with a strong global identity might consider climate change relevant regardless of whether they perceive it as affecting themselves in their immediate surroundings or rather other people in remote places. Drawing a similar connection, McFarland et al. (2012) wrote that "individuals who truly possess an identification with all humanity should care about humanity's struggles and sufferings. As a consequence, they should be likely to attend more than others to distant events that affect large numbers of human beings, even though these do not directly affect Americans, their community, or their own lives" (p. 844).

Brügger, Dessai et al. (2015) made a complementary argument. They stated that proximising can be an effective strategy to increase the relevance of climate change if the addressed person cares about the proximal place. However, people differ in what is known as place attachment to their local surroundings. Place attachment can be felt not only for one's neighbourhood, hometown, region, or country but also for a continent or the planet, making it a concept with similarities to the idea of a global identity as conceptualised by IWAH (Devine-Wright, 2013; Devine-Wright et al., 2015).

To my knowledge, no empirical research has investigated the interaction between the psychological socio-spatial distance of issues and global identity. However, based on the theoretical argument outlined above, I hypothesised the following pattern for global identity as a trait (see Figure 8):

H8: The relation between the psychological socio-spatial distance of climate change and the relevance attributed to the climate change issue is moderated by individuals' global identity. The more people identify with people all over the world, the smaller the relation (i.e., people who only weakly identify with people all over the world will evaluate climate change as more relevant as their psychological socio-spatial distance declines, while it will make no difference or at least a smaller difference for people who strongly identify with people all over the world).

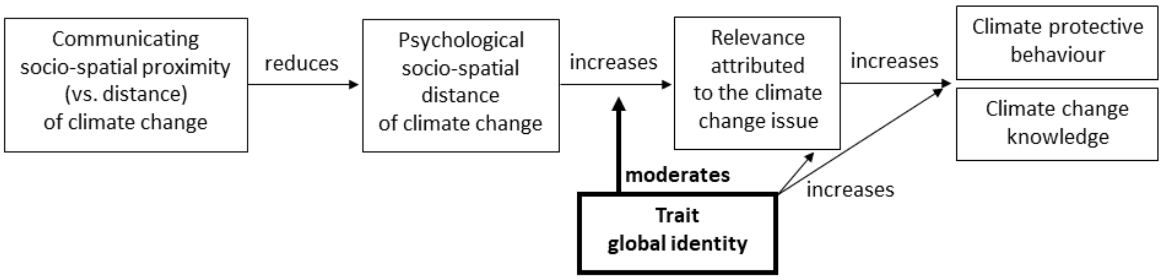


Figure 8. Assumed moderating impact of global identity as a trait.

Moreover, I assumed a parallel pattern for situational global identity salience (see Figure 9):

H9: The relation between the psychological socio-spatial distance of climate change and the relevance attributed to the climate change issue will be moderated by global identity salience. More specifically, the negative relation between psychological socio-spatial distance and relevance will be weaker if global identity as a human is made salient.

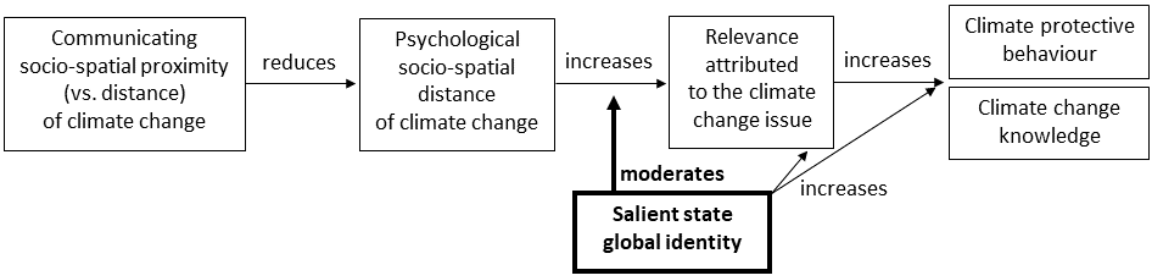


Figure 9. Assumed moderating impact of global identity salience.

2.6 Global identity in the current approach

Conceptualisation. I theoretically and empirically adopt the concept of IWAH introduced by McFarland et al. (2012) and differentiated by Reese et al. (2015), as it appears most theoretically grounded and elaborated. McFarland et al. (2012) conceptualised *global identity as a trait* that is 1-dimensional and defined as the degree to which people identify with all humans and feel a deep concern for their well-being. Reese et al. (2015) split this into two dimensions. *Global self-definition* refers to self-categorisation to the inclusive ingroup of all humanity. *Global self-investment* refers to caring for all humans and showing solidarity. While McFarland et al. (2012) regarded IWAH as a stable trait, SCT assumes that situational cues in the social context can trigger which level of inclusion is salient and hence whether people's personal identity, social identity, or identity as a human becomes relevant for perceptions and actions (Turner et al., 1987). Therefore, in Study 3, I conceptualised *situational global identity as a state* that might be able to be made salient by communicative means (Trepte & Loy, 2017).

Operationalisation. Existing measures are as varied as the conceptualisations and names for global identity (see Chapter 2.5.1). However, a closer look reveals that they are in fact quite similar and share items or wording. Table 1 provides an overview.

Authors working in the IWAH tradition developed the *Identification with All Humanity Scale* (McFarland et al., 2012). It consists of nine 3-part items referring to a) people in the community, b) the nation (here Americans), and c) all humans/ people all over the world (i.e., the IWAH measure is formed out of these; see Table 1). All items are answered on a 5-point Likert scale. Ten studies have tested the validity and reliability of this scale.

As indicators of convergent construct validity, IWAH was positively related with dispositional empathy, principled moral reasoning, and moral identity (Study 1 with N = 200 US students). Moreover, it was negatively related with the antithetical constructs of ethnocentrism, right-wing authoritarianism, and social dominance orientation (Study 1 and Study 2 with N = 218 adults from the general public in the United States). As an indicator of discriminant construct validity, IWAH and Schwartz's (1992) value of universalism independently predicted the criterion variable commitment to human rights (Study 6 with N = 149 US students).

Results showing that the IWAH scale predicted globalism (i.e., the importance of humanitarian foreign policy goals) and commitment to universal human rights above national goals can be interpreted as implying its criterion validity (Studies 1 and 2). Further, IWAH predicted valuing the lives of Afghans and Americans more equally while controlling for ethnocentrism, social dominance orientation, dispositional empathy, authoritarianism, and conservatism (Study 7 with samples of N = 102 adults and N = 143 students in the US). Moreover, it predicted global humanitarian knowledge (Study 8 with N = 79 students in the United States) as well as selective exposure to media content of global prosocial concern (Study 9 with N = 139 students and N = 196 adults in the United States) above and beyond other relevant variables. Finally, IWAH predicted hypothetical willingness to donate to humanitarian charities (Study 10 with N = 3,033 people who filled out questionnaires on the website yourmorals.org, which includes the IWAH measure).

Confirming retest reliability, the measure was stable in N = 166 US students across a period of 10 weeks (r = .69, Study 3). The self-other consistency of the self-report measure was also investigated (r = .42, Study 4 with N = 122 dyads consisting of US students and people they were related to). In Study 5, N = 15 members of the organisation Human Rights Watch and N = 18 of the Church World Service were investigated as groups with high expected scores. Compared to a matched subsample of Study 2, their IWAH was indeed more than one scale point higher. Finally, internal consistency in the form of Cronbach's alpha was reported as α = .81 (Study 1), α = .83 (Study 2), α = .83 (Study 3), α = .85 and α = .89 (Study 4), α = .79 and α = .62 (Study 5), α > .80 (Studies 6, 7, 8), α = .90 (Study 10).

The IWAH scale has been adapted to and validated in a German context (Reese et al., 2015, Study 2). Moreover, Reese et al. (2015) found that the factorial structure of the English IWAH measure corresponded to the two dimensions of self-definition and self-investment in an exploratory factor analysis with data from an international sample of N = 65 participants (Study 1). Here, Items 1-4 built one factor interpreted as self-definition, with Item 2 and Item 3 reflecting self-stereotyping and Item 1 and Item 4 rather reflecting homogeneity. However, the authors state that Item 1 and Item 4 could also go beyond this and imply emotional attachment. Items 6-9 built a second factor interpreted as self-investment, and particularly the solidarity component. Item 5 loaded moderately on both factors. In their follow-up Study 2 with $N = 229$ students in Germany, a confirmatory factor analysis (CFA) provided further evidence for the 2-factorial structure (Factor 1 with Items 1-4, Factor 2 with Items 6-9, excluding Item 5) in the form of a significantly better model fit compared to a 1-dimensional model. Moreover, the authors assessed whether the two dimensions differentially predicted convergent constructs. Self-investment but not self-definition positively predicted dispositional empathy and moral identity, and negatively predicted right-wing authoritarianism and social dominance orientation as assessed by McFarland et al. (2012). In addition, self-investment but not self-definition predicted perceived injustice of global inequality. As a criterion variable, self-investment predicted intentions to act against global inequality while controlling for self-definition and the other convergent measures. Both self-investment and self-definition predicted perceived homogeneity of the ingroup, contrary to the hypothesised stronger relation between self-definition and homogeneity.

Reysen and Hackett (2016) implemented a third approach to validating the IWAH scale. They argued that Items 1 to 4 are typical of social identity approaches, whereas Items 5 to 9 reflect concern, helping, responsibility, and loyalty regarding the ingroup and would, from a SIT perspective, be considered as outcomes of identification. They "capture IWAH from an Adler/Maslow perspective" (p. 2). Their two dimensions of SIT items and Adler/Maslow items thus correspond to the dimensions of self-definition and self-investment proposed by Reese et al. (2015). In three studies with $N = 239$ and $N = 289$ students in the United States as well as a sample of $N = 358$ adults from Amazon's Mechanical Turk, they conducted exploratory factor analyses and CFA suggesting one factor for Items 1 to 4 (SIT), one factor for Items 6 to 9 (Adler/Maslow), and Item 5 loading on both. Several convergent prosocial and antithetical value constructs were assessed, following McFarland et al. (2012). Most were strongly correlated with the Adler/Maslow factor and weakly correlated with the SIT factor (for details, see Reysen & Hackett, 2016, p. 5). Hence, their results are consistent with the findings of Reese et al. (2015).

Reflecting on the differential predictive power of the self-definition (or SIT) factor and the self-investment (or Adler/Maslow) factor, I wondered whether this might partly be the case because the self-investment items are easier for participants to answer. They seem more concrete and less ambiguous. In my research, I used the German version of the IWAH scale by Reese et al. (2015) in Study 1 (see Chapter 4.2.3.7) and Study 2 (see Chapter 5.2.4.5), and attempted to convert it into a situational measure in Study 3 (see Chapter 6.2.4.5). I differentially investigated the dimensions of global self-definition and global self-investment in order to reveal possible differences.

Table 1. Measures of global identity

<table>
<tr><th>Concept</th><th>Operationalisation</th></tr>
<tr><td>Identification with all humanity (IWAH)</td><td>Identification With All Humanity Scale (McFarland et al., 2012; German version, Reese et al., 2015)

Answer format: 5-point scale with scale points referring to the groups "people in my community", "people in my country" (e.g. Americans), "people all over the world (all humans everywhere/people anywhere in the world/all mankind"). Items on the third group build IWAH.

1. How close do you feel to each of the following groups?
2. How often do you use the word "we" to refer to the following groups of people?
3. How much would you say you have in common with the following groups?
4. Sometimes people think of those who are not a part of their immediate family as "family". To what degree do you think of the following groups of people as "family"?
5. How much do you identify with (that is, feel a part of, feel love toward, have concern for) each of the following?
6. How much would you say you care (feel upset, want to help) when bad things happen to …
7. How much do you want to be a responsible citizen (for each group)?
8. How much do you believe in being loyal to (each group)?
9. When they are in need, how much do you want to help (each group)?</td></tr>
<tr><td rowspan="3">Global (social) identity/ global identification</td><td>Local-Global-Identity Scale (Tu et al., 2012)

Answer format: 7-point scale from 1 (strongly disagree) to 7 (strongly agree)

Global identity:
1. I care about knowing global events.
2. My heart mostly belongs to the whole world.
3. I believe that people should be made aware of how connected we are to the rest of the world.
4. I identify that I am a global citizen.
Local identity:
5. I care about local events.
6. My heart mostly belongs to my local community.
7. I respect my local tradition.
8. I identify that I am a local citizen.</td></tr>
<tr><td>Global social identification (Reese et al., 2014)

Answer format: 7-point scale from 1 (I totally disagree) to 7 (I totally agree)

1. I feel strongly connected to the world community as a whole.
2. It is important for me to define myself as a part of the world community.
3. I feel strongly connected to the members of the world community.
4. I am aware to be part of the world community.
5. Being part of the world community is an important aspect of my identity.</td></tr>
<tr><td>Global identity (Renger & Reese, 2017)

Answer format: 7-point scale from 1 (not true at all) to 7 (completely true)

1. I see myself as a global citizen.
2. I can identify with the slogan ‘we are all humans of one world'.
3. I feel connected with the whole earth.
4. I feel as a part of the earth.</td></tr>
</table>

Global (social) identity/ global identification (continued)	Global Identity Scale (Türken & Rudmin, 2013) Answer format: 6-point scale from 1 (*strongly agree*) to 6 (*strongly disagree*) Cultural openness dimension: 1. I consider myself more as a citizen of the world than a citizen of some nation. 2. I could live in other cultures than my own. 3. I identify with a world community. 4. I enjoy learning about different cultures. 5. I like listening to music from different cultures. Non-nationalism dimension (reverse-coded): 6. My own culture is the best in the whole world. 7. One should first care for his or her nation, then others. 8. I feel intense pride when I think about my country. 9. I feel most connected to members of my own country. 10. My country is one of the best in the world.
	Global Social Identity (Buchan et al., 2011) Answer format: 4-point scale from 1 (*not at all*) to 4 (*very much*) 1. How strongly do you feel attachment to your community in (local city) / to your community in (nation) / to the world as a whole? 2. How strongly do you define yourself as a member of your community in (local city) / to your community in (nation) / to the world as a whole? 3. How close do you feel to other members of your community in (local city) / to your community in (nation) / to the world as a whole?
Global citizenship	Global citizenship (Reysen & Katzarska-Miller, 2013) Answer format: 7-point scale from 1 (*strongly disagree*) to 7 (*strongly agree*) Global awareness: 1. I understand how the various cultures of this world interact socially. 2. I am aware that my actions in my local environment may affect people in other countries. 3. I try to stay informed of current issues that impact international relations. 4. I believe that I am connected to people in other countries and my actions can affect them. Normative environment: 1. If I called myself a global citizen most people who are important to me would approve. 2. Most people who are important to me think that being a global citizen is desirable. Global citizenship identification: 1. I would describe myself as a global citizen. 2. I strongly identify with global citizens.
Global belonging	Dimension global belonging of the concept world-mindedness (Der-Karabetian et al., 2014) Answer format: 7-point scale from 1 (*disagree strongly*) to 6 (*agree strongly*) 1. I feel that I am living in a global village. 2. I feel that what I do as a person could "touch" someone in other parts of the world. 3. I feel like I am "next door neighbours" with people living in other parts of the world. 4. I feel that I am related to everyone in the world as if they were my family. 5. I feel that people around the world are more similar than different. 6. I think of myself as a citizen of the world. 7. I feel like my fate and future are bound with all of humankind.

Global orientation	Global Orientation Scale (Chen et al., 2016) Answer format: 7-point scale from 1 (*strongly disagree*) to 7 (*strongly agree*) Multicultural acquisition dimension: 1. I learn and speak languages other than my mother tongue. 2. Cultural diversity is beneficial to a society. 3. I am proud of being able to speak more than one language. 4. I travel abroad to gain experiences with other cultures. 5. It is important to recognize differences among various cultural groups. 6. Efforts should be made to understand people from different cultural backgrounds. 7. I am curious about traditions of other cultures. 8. I read books or magazines to obtain knowledge about other cultures. 9. I am eager to make friends with people from different cultural backgrounds. 10. I try food from different cultures. 11. One should actively involve himself or herself in a multicultural environment. 12. I learn customs and traditions of other cultures. 13. I am happy to learn the history and geography of other cultures. Ethnic protection dimension: 14. I find living in a multicultural environment very stressful. 15. I make friends mostly with people of the same cultural origin as mine. 16. My own culture is much superior to other cultures. 17. I stick to the norms of my own culture no matter where I am. 18. Speaking another language makes me nervous. 19. Immigrants and ethnic minorities should forget their cultures of origin as much as possible for better adaption to their new environment. 20. I feel isolated from people of other cultural groups. 21. I appreciate art, music and entertainments from my culture only. 22. I have a set of beliefs about certain cultural groups that I use to help me predict behaviors of their members. 23. The ways that people of different cultural origins think and act often make me confused. 24. I dress in my own cultural style regardless of the occasion. 25. I am worried that people from other cultures would not understand my ways of doing things.
Global place attachment	Place attachment (Devine-Wright et al., 2015) Answer format: 5-point scale from 1 (*No sense of belonging*) to 5 (*Very strong sense of belonging*) To what extent do you feel a weak or a strong sense of belonging to the following areas? (The last item measures global place attachment) 1. The neighbourhood where you live 2. The city where you live (if relevant) 3. The state or territory where you live 4. Australia 5. The Earth/The whole world
Global Empathy	Global Empathy Scale (Bachen et al., 2012) Answer format: not stated 1. I am aware of how the political and social rights (e.g. ethnic, racial or gender) of people in other countries can be quite different from my own. 2. I am aware that people in other countries can have their freedoms or rights taken away. 3. I am aware of political, social and economic barriers that lead to discrimination of people in other countries. 4. It is easy for me to understand what it would feel like to be a person living in a different country than my own.

	5. I can relate to the frustration that some people of different countries feel about having fewer opportunities due to the economic, political or social circumstances of their countries. 6. I feel motivated to help promote changes that improve people's living conditions in different parts of the world. 7. I am likely to participate in events that promote equal rights for people in other countries. 8. I feel supportive of those in other countries who may experience injustice because of their political or social (e.g., ethnic, racial, or gender) background. 9. I can see myself taking action (e.g., signing a petition or sending money) to help those in another country who are experiencing discrimination because of their political or social background. 10. I share the anger of those in other countries who face injustice because of their political or social (e.g., ethnic, racial, or gender) background. 11. I feel that being actively involved in global or international issues is my responsibility.
Global prosociality	Cosmopolitan Orientation Scale (Leung et al., 2015) Answer format: 7-point scale from 1 (*strongly disagree*) to 6 (*strongly agree*) Cultural openness dimension: 1. It is exciting to immerse in a foreign culture. 2. I am willing to study or work abroad in another culture. 3. I am open to living in a different culture. 4. I enjoy learning more about different cultures in the world. 5. I want to travel to experience many different cultures. Global prosociality dimension: 1. I want to play my part to help make the world a better place for all. 2. I would serve the world community by helping human beings. 3. I get upset when people do not want to offer help when those in need are foreigners. 4. When people from other countries are in need, I will help them to the best of my abilities. 5. I want to help the unfortunate ones even if they are from other countries. Respect for cultural diversity dimension: 1. I embrace cultural diversity. 2. I respect cultural differences. 3. It is important to preserve the authenticity of native cultures. 4. We should celebrate cultural differences. 5. I am against having one dominating culture.
Universal orientation	Universal orientation (Krämer et al., 2017) Answer format: 7-point scale from 1 (*strongly disagree*) to 7 (*strongly agree*) 1. At one level of thinking, all humans are the same. 2. There is a certain beauty in everyone. 3. On a higher level, all of us share a common bond. 4. All life is interconnected. 5. Although individual people may be difficult, I feel an emotional bond with all of humanity. 6. On some level my life is intimately tied to all humankind.

Universal orientation (continued)	Universal Orientation Scale (Phillips, S. T. & Ziller, 1997) Answer format: 5-point scale from 1 (*does not describe me well*) to 5 (*describes me well*) 1. The similarities between males and females are greater than the differences. 2. I tend to value similarities over differences when I meet someone. 3. At one level of thinking we are all of a kind. 4. I can understand almost anyone because I'm a little like everyone. 5. Little differences among people mean a lot. 6. I can see myself fitting into many groups. 7. There is a potential for good and evil in all of us. 8. When I look into the eyes of others I see myself. 9. I could never get accustomed to living in another country. 10. When I first meet someone I tend to notice differences between myself and the other person. 11. "Between" describes my position with regard to groups better than does "in" and "out." 12. The same spirit dwells in everyone. 13. Older persons are very different than I am. 14. I can tell a great deal about a person by knowing their gender. 15. There is a certain beauty in everyone. 16. I can tell a great deal about a person by knowing his/her age. 17. Men and women will never totally understand each other because of their inborn differences. 18. Everyone in the world is very much alike because in the end we all die. 19. I have difficulty relating to persons who are much younger than I. 20. When I meet someone I tend to notice similarities between myself and the other person.
Ingroup identification	Ingroup identification (Leach et al., 2008); could be adapted to global identification Answer format: 7-point scale from 1 (*strongly disagree*) to 7 (*strongly agree*) (Group-Level) Self-Investment *Solidarity* 1. I feel a bond with [In-group]. 2. I feel solidarity with [In-group]. 3. I feel committed to [In-group]. *Satisfaction* 4. I am glad to be [In-group]. 5. I think that [In-group] have a lot to be proud of. 6. It is pleasant to be [In-group]. 7. Being [In-group] gives me a good feeling. *Centrality* 8. I often think about the fact that I am [In-group]. 9. The fact that I am [In-group] is an important part of my identity. 10. Being [In-group] is an important part of how I see myself. (Group-Level) Self-Definition *Individual Self-Stereotyping* 11. I have a lot in common with the average [In-group] person. 12. I am similar to the average [In-group] person. *In-Group Homogeneity* 13. [In-group] people have a lot in common with each other. 14. [In-group] people are very similar to each other.

3. Overview of the current approach

3.1 Concepts and hypotheses

Generally speaking, my research aim was to contribute to understanding whether and how communicating the socio-spatial proximity vs. distance of climate change in news coverage influences individuals' psychological socio-spatial distance, relevance attributed to the issue, climate change knowledge, and climate protective behaviour. Moreover, I sought to clarify the role of a global identity as a potential moderating individual characteristic that bridges the psychological socio-spatial distance of climate change (i.e., whether the relation between psychological socio-spatial distance and the relevance attributed to the climate change issue is weaker for people with a strong global identity). Finally, I aimed to find out whether making a person's global identity as a human salient through communicative means could bridge the psychological socio-spatial distance of climate change. After beginning with a correlational approach in Study 1, insights into the causal impacts of communicating proximity vs. distance were gained in the experimental Studies 2 (laboratory study) and 3 (online field study). Table 2 summarises the conceptualisations and operationalisations. The studies tested the following general hypotheses (H6 and H8 were only addressed in Study 1 and Study 2, and H7 and H9 were only addressed in Study 3):

H1: Communication of socio-spatial proximity (vs. distance) of climate change in news coverage reduces recipients' *psychological socio-spatial distance* of climate change.

H2: Communication of socio-spatial proximity (vs. distance) of climate change in news coverage increases the *relevance attributed to the climate change issue* indirectly through a reduced psychological socio-spatial distance of climate change.

H3: Communication of socio-spatial proximity (vs. distance) of climate change in news coverage increases *climate protective behaviour* indirectly through a reduced psychological socio-spatial distance of climate change and an increased relevance attributed to the climate change issue (serial indirect relation).

H4: Communication of socio-spatial proximity (vs. distance) of climate change in news coverage increases *climate change knowledge* indirectly through a reduced psychological socio-spatial distance of climate change and an increased relevance attributed to the climate change issue (serial indirect relation).

H5: Climate change knowledge is positively related to climate protective behaviour.

RQ1: Is the relation with climate protective behaviour different for climate system knowledge compared to climate protective behavioural knowledge?

H6: Individuals' global identity as a trait positively predicts a) the relevance attributed to the climate change issue, b) climate protective behaviour, and c) climate change knowledge.

H7: Making global identity salient increases a) the relevance attributed to the climate change issue, b) climate protective behaviour, and c) climate change knowledge.

H8: The relation between the psychological socio-spatial distance of climate change and the relevance attributed to the climate change issue is moderated by individuals' global identity. The more people identify with people all over the world, the smaller the relation (i.e., people who only weakly identify with people all over the world will evaluate climate change as more relevant when their psychological socio-spatial distance is lower, while it will not make a difference or at least a smaller difference for people who strongly identity with people all over the world).

H9: The relation between the psychological socio-spatial distance of climate change and the relevance attributed to the climate change issue is moderated by global identity salience. More specifically, the negative relation between psychological socio-spatial distance and relevance will be weaker when an individual's global identity as a human is made salient.

I will outline how I specified these hypotheses when discussing the concrete studies within the respective chapters. The individual studies further included additional research questions, which will also be outlined in the respective chapters.

Table 2. Conceptualisations and operationalisations

Concept	**Definition**	**Operationalisations**
Perceived communicated distance of climate change in news coverage (4-dimensional)	Subjective perception that news portrays climate change as distant on four dimensions: 1. Perceived communicated social distance (i.e., news portrayal is mainly about other people) 2. Perceived communicated spatial distance (i.e., news portrayal is mainly about remote locations) 3. Perceived communicated temporal distance (i.e., news portrayal is mainly about the future) 4. Perceived communicated hypothetical distance (i.e., news portrayal is mainly about uncertain opinions)	Self-report measure ▪ Study 1: perception of general news coverage (1 item on each dimension) ▪ Study 2: Manipulation check for the variation of communicated socio-spatial proximity vs. distance in a provided news text (2 items on each dimension) ▪ Study 3: Manipulation check for the variation of communicated socio-spatial proximity vs. distance in a provided news text (2 items on each dimension)
Perceived communicated *socio-spatial* distance of climate change in news coverage	Subjective perception that news portrays climate change as distant on two of the above dimensions: 1. Perceived communicated social distance (i.e., news portrayal is mainly about other people) 2. Perceived communicated spatial distance (i.e., news portrayal is mainly about remote locations)	Part of the self-report measure (see above) ▪ Study 1: perceived communicated spatial distance and social distance (2 items)
Communication of socio-spatial *proximity* of climate change in news coverage (i.e., "proximising climate change")	Focus in news about climate change on proximal consequences in terms of 1. communicated social proximity (consequences for the addressed audience) 2. communicated spatial proximity (local consequences) → Both aspects are confounded	Experimental stimulus ▪ Study 2: News text about climate change consequences in Germany (German recipients) ▪ Study 3: News text about climate change consequences in the UK (UK recipients)
Communication of socio-spatial *distance* of climate change in news coverage	Focus in news about climate change on distant consequences in terms of 1. communicated social distance (consequences for others) 2. communicated spatial distance (global consequences) → Both aspects are confounded	Experimental stimulus ▪ Study 2: News text about global climate change consequences mainly in developing countries (German recipients) ▪ Study 3: News text about climate change consequences in Bangladesh (UK recipients)

Concept	**Definition**	**Operationalisation**
Psychological distance of climate change (4-dimensional)	Subjective perception that climate change is a distant phenomenon from the self on four dimensions: 1. Psychological social distance (i.e., climate change mainly affects other people) 2. Psychological spatial distance (i.e., climate change mainly affects remote locations) 3. Psychological temporal distance (i.e., climate change impacts are mainly in the future) 4. Psychological hypothetical distance (i.e., climate change impacts are uncertain)	Self-report measure ▪ Study 1: 4 items on social distance, 4 items on spatial distance, 3 items on temporal distance, 3 items on hypothetical distance ▪ Study 2: 4 items on social distance, 4 items on spatial distance, 3 items on temporal distance, 3 items on hypothetical distance ▪ Study 3: 3 items on social distance, 4 items on spatial distance, 3 items on temporal distance, 3 items on hypothetical distance
Psychological *socio-spatial* distance of climate change	Subjective perception that climate change is a distant phenomenon from the self on two confounded dimensions of psychological distance, which are addressed by the communication strategy of proximising climate change: 1. Psychological social distance (i.e., perception that climate change mainly affects other people) 2. Psychological spatial distance (i.e., perception that climate change mainly affects remote locations)	Part of the self-report measure (see above) ▪ Study 1: 4 items on social distance, 4 items on spatial distance ▪ Study 2: 3 items on social distance, 3 items on spatial distance (reduced based on CFA) ▪ Study 3: 3 items on social distance, 4 items on spatial distance
Relevance attributed to the climate change issue	Subjective evaluation that climate change is a relevant issue	Self-report measure ▪ Study 1: 4 items on personal relevance of the climate change issue, 4 items on societal relevance of the climate change issue
Relevance attributed to a news text about the climate change issue	Subjective evaluation that a news text on the climate change issue is relevant	Self-report measure ▪ Study 2: 5 items about the relevance of the received news text ▪ Study 3: 5 items about the relevance of the received news text

Concept	**Definition**	**Operationalisation**
Climate protective behaviour	Behaviour that contributes to climate mitigation. Four domains were examined: 1. Transport 2. Energy use 3. Resource use and consumption 4. Political and social actions	Self-report measure ▪ Study 1: 35 items on behaviours in the different domains ▪ Study 3: 22 items on *intended* future behaviours in the different domains Observation ▪ Study 2: information behaviour regarding provided climate protective engagement options (amount and time), donation to climate organisation ▪ Study 3: information behaviour regarding provided climate protective engagement options (amount and time), hypothetical budget allocation task (number of supported climate initiatives, allocated budget)
Climate change knowledge	Factual knowledge: 1. Climate system knowledge on ▪ CO_2 and the greenhouse effect ▪ climate change and its causes ▪ expected consequences of climate change 2. Climate protective behavioural knowledge ▪ Climate-related actions ▪ Effectiveness of climate-related actions	Knowledge test ▪ Study 1: 21 items on climate system knowledge, 7 items on climate protective behavioural knowledge (6 items on the effectiveness of climate-related actions had to be excluded due to a programming mistake) ▪ Study 2: 28 items on climate system knowledge, 8 items on climate protective behavioural knowledge ▪ Study 3: 28 items on climate system knowledge, 11 items on climate protective behavioural knowledge
Global identity (trait)	1. A definition of the self as part of all humanity (global self-definition dimension) 2. Concern and caring for the well-being of all humans (global self-investment dimension)	Self-report measure ▪ Study 1: 4 items global self-definition, 4 items self-investment ▪ Study 2: 4 items global self-definition, 4 items self-investment
Situational global identity	Situational salience of 1. a definition of the self as part of all humanity (global self-definition dimension) 2. concern and caring for the well-being of all humans (global self-investment dimension)	Self-report measure ▪ Study 3: 5 items global self-definition, 5 items self-investment

3.2 Study designs

In Study 1 (see Chapter 4), a cross-sectional survey conducted via an online panel provider with a quota sample of German Internet users, I examined the associations between the perceived communicated socio-spatial distance of climate change in news coverage, the psychological socio-spatial distance of climate change, the relevance attributed to the climate change issue, climate change knowledge, and climate protective behaviour. Moreover, I investigated the moderating and predicting role of global identity as a trait.

In Study 2, I conducted a laboratory experiment with students at the University of Hohenheim in Germany (see Chapter 5). I varied the communicated socio-spatial distance in a news text on climate change in a one-factorial between-subjects design with three conditions (focus on proximal consequences for the audience vs. socio-spatially distant others vs. control condition without stimulus). Psychological socio-spatial distance of climate change, relevance attributed to the news text, climate change knowledge communicated in the news text, and two outcome measures reflecting climate protective behaviour (i.e., information behaviour, donation) were assessed as dependent variables. Moreover, global identity was measured as a potential moderating trait variable.

In Study 3, I conducted an online experiment via an online panel provider with a sample of Internet users in the UK (see Chapter 6). Again, communicated socio-spatial distance in a news text on climate change was varied. Moreover, as a second experimental factor, a video communicating the connectedness of people all over the world was used in an attempt to make global identity situationally salient. This resulted in a 2 (news text: proximity vs. distance) × 2 (video: connectedness vs. control) + 1 (control condition without stimulus) between-subjects design. Psychological socio-spatial distance of climate change, the relevance attributed to the news text, climate change knowledge communicated in the news text, and two outcome measures reflecting climate protective behaviour (i.e., information behaviour, budget allocation) as well as behavioural intentions were assessed as dependent variables. Moreover, global identity was assessed with a situational measure.

3.3 Statistical analyses

All analyses were conducted using the statistical environment *R* (version 3.4.4). As my main source of information, I consulted the book by Field, Miles, and Field (2012). The books by Kline (2016) and Hair, Black, Babin, and Anderson (1998) were also important references. An α-level of .05 (two-tailed) was used for all statistical tests. I report results with an α-level above .05 only if of particular interest. Effect sizes are evaluated according to Cohen's (1992) suggestions. For *t*-tests comparing two group means, I calculated the effect size Cohen's *d,* with $d = 0.20$ representing a small, $d = 0.50$ a medium, and $d = 0.80$ a large effect size. Pearson's correlation coefficient is reported for interval data, and Spearman's rho for ordinal data, with $r = .10$ representing a small, $r = .30$ a medium, and $r = .50$ a large effect size. For F tests in analyses of variance with more than two groups, I calculated ω^2 according to the formula provided by Field et al. (2012, p. 455). It has been suggested to evaluate $\omega^2 = .01$ as a small, $\omega^2 = .06$ as a medium, and $\omega^2 = .14$ as a large effect size (Kirk, 1996).

3.3.1 Missing values and implausible values

Missing values were rare in all three studies because the items were programmed with a reminder function for participants if a question was not answered. However, they could then choose to skip the question. As this was rarely the case and only one or two participants had missing values for all of the variables included in the models, I decided not to use substitution procedures in the form of maximum likelihood estimation or imputation. Case deletion can be considered if the number of missing values is small and thus statistical power does not suffer considerably (Schafer & Graham, 2002). When cases were excluded from an analysis, I report the number of excluded cases and the resulting sample size. Apart from missing values, there were a few implausible values in the data sets. I explain their origins and how I treated them in the sections on the respective measures.

3.3.2 Descriptive analyses, exploration of assumptions, correlation, and regression

I used the *R* package *car* (Fox, J., Weisberg, & Price, 2018) to recode variables. For descriptive analyses, I used the *R* packages *psych* (Revelle, 2018) and *car*. I also employed graphic procedures using the *R* package *ggplot2* (Wickham & Chang, 2016) to explore assumptions such as a normal distribution. I used the *R* packages *car* and *QuantPsyc* (Fletcher, 2015) to calculate correlations and conduct regression analyses.

3.3.3 Structural equation modelling

I used the *R* packages *lavaan* (Rosseel, 2017) and *semTools* (semTools Contributors, 2016) for confirmatory factor analyses (CFA), path analyses, and their combination, structural equation modelling (SEM). Before conducting the analyses, I tested the assumptions for using maximum likelihood estimation. To examine whether the assumption of multivariate normality was supported, I conducted multivariate Shapiro-Wilk tests using the *R* package *mvShapiroTest* (Gonzalez-Estrada & Villasenor-Alva, 2013). As this assumption was not met for all my analyses, which is common in complex models, I refrain from reporting the results of this test for each individual analysis. In all cases, I conducted robust maximum likelihood estimation with Huber-White standard errors (White, 1980).

In order to examine my research questions and hypotheses in an overall model, I conducted multivariate path analyses using factor scores from CFAs (i.e., for the measures of psychological socio-spatial distance, relevance attribution, and global identity) and Rasch scores (i.e., for measures of climate protective behaviour, climate protective behavioural intentions, and climate change knowledge; for information on Rasch modelling, see Chapter 3.3.4). While SEM has the advantage of increased reliability due to systematically considering measurement error, conducting path analyses instead of SEM reduces model complexity and idiosyncratic influences of the items. This is particularly useful in models including moderators. Here, SEM analyses often do not converge. Simulation studies revealed that biases resulting from the use of factor scores are minimal if they are not estimated for binary indicators and small samples (Yang, Nay, & Hoyle, 2010). In addition to considering *p*-values, I tested all relations for significance by applying bootstrapped confidence intervals with 1,000 samples (Hayes & Scharkow, 2013) using the *R* package *boot* (Canty & Ripley, 2017).

Many approaches to reporting and evaluating model fit have been proposed (see e.g., Kline, 2016, pp. 262–299). Most authors caution against rules of thumb that specify certain values on fit indicators as “acceptable” model fit. The often-cited work of Hu and Bentler (1999) proposed a set of thresholds for approximate fit indexes based on Monte Carlo simulation studies. However, they “never intended their rules of thumb for approximate fit indexes to be treated as anything other than just that” (Kline, 2016, p. 267). More recent simulation studies have raised doubts on the usefulness of these thresholds and some authors even suggest “a ban on approximate fit indexes” (p. 268).

However, I will nevertheless outline rules of thumb that have been mentioned by different authors (e.g., Hair et al., 1998, pp. 654–661; Hu & Bentler, 1999). Kline (2016) recommends a minimum set of four fit statistics, namely the model chi-square, the root mean square error of approximation, the comparative fit index, and the standardised root mean square residual. These are explained below. However, he emphasises not to "try to justify retaining the model by depending solely on discredited thresholds" (p. 269).

The most fundamental fit measure is the *likelihood ratio chi-square statistic*. A large chi-square value relative to the degrees of freedom indicates that the estimated and observed covariance or correlation matrices differ considerably. A statistical significance level for this difference can be reported. Hence, statistical non-significance indicates that the proposed model fits the data well. However, the chi-square measure has been criticized for being too sensitive to sample size, particularly beyond 200. In large samples, significant differences are found for all specified models. On the other hand, the chi-square statistic can indicate acceptable fit for samples below 100 even if all model relationships are nonsignificant. Therefore, the chi-square measure should be complemented with other goodness-of-fit measures.

The *root mean square error of approximation* (RMSEA) is an absolute fit index and considers the discrepancy between the observed and estimated data in terms of the population per degree of freedom. It takes into account and is thus relatively independent of sample size. A value of 0 represents an optimal fit, and values less than .08 are regarded as acceptable according to Hair et al. (1998); values less than .06 are recommended by Hu and Bentler (1999). A confidence interval can be estimated in order to evaluate the precision of the estimate.

The *standardised root mean square residual* (SRMR) is also an absolute fit index and represents the mean standardised difference between the observed and estimated covariance matrices. However, it depends on sample size and gets smaller with increasing sample size. A value of 0 represents an optimal fit, and values less than .08 are recommended by Hu and Bentler (1999).

The *comparative fit index* (CFI) is a normed incremental fit index and evaluates whether the proposed model fits the data better than a model in which all observed variables are uncorrelated (independence model). It ranges from 0 to 1. Values greater than .95 are recommended by Hu and Bentler (1999). This indicates that the proposed model fits the data 95% better than the independence model.

In addition, I report the *Tucker-Lewis index* (TLI), a non-normed incremental fit index (i.e., values can fall outside the 0-1 range). Like the CFI, it evaluates whether the proposed model fits the data better than a model in which all observed variables are uncorrelated (independence model) and is highly correlated with the CFI. However, it compensates for the effect of model complexity. Values greater than .90 are regarded as acceptable according to Hair et al. (1998), and values greater than .95 are recommended by Hu and Bentler (1999).

For RMSEA, CFI, and TLI, *lavaan* also provides robust versions. I additionally report these when their values differ from the regular version. When evaluating a scale with a CFA, the *factor loadings* should also be examined (i.e., correlations or covariances between variables and factors). The greater the loading, the more a variable can be regarded as a pure measure of the factor. According to a common rule of thumb, factor loadings are considered excellent when they are ≥ .71 (50% overlapping variance), very good when they are ≥ .63 (40% overlapping variance), good when they are ≥ .55 (30% overlapping variance), and poor when they are < .32 (10% overlapping variance; Tabachnick & Fidell, 2007, p. 649).

I calculated Cronbach's alpha (Cronbach, 1951) as an indicator of internal consistency. Moreover, the package *semTools* provides three indicators of omega (semTools Contributors, 2016, p. 113), and I will report the coefficient according to Raykov (2001). For both, values above .70 are usually regarded as acceptable, above .80 as satisfactory. In addition, I determined the average variance extracted (AVE). Here, values above .50 can be regarded as satisfactory, as this indicates that more than 50% of the variance in the latent variable can be explained by the indicators rather than measurement error (Fornell & Larcker, 1981).

3.3.4 Rasch modelling

The knowledge measures in all three studies as well as the measure of behaviour in Study 1 and of behavioural intention in Study 3 were analysed based on item response theory (IRT), more specifically the Rasch model (for details, see Bond & Fox, 2007). In a Rasch model, the latent person parameters θ (e.g., knowledge) can be estimated independently from the items used, and the latent item parameters δ (i.e., difficulty) can be estimated independently from the sample used (i.e., so-called specific objectivity). This has the advantage that the measures can be rather flexibly adapted to one's research context. The probability that a person solves or agrees to an item is determined by the difference between the person parameter and the item parameter.

I used the *R* package *eRm* for Rasch modelling (Mair, Hatzinger, Maier, & Rusch, 2018). It applies conditional maximum likelihood (CML) estimation, which makes it possible to separate item parameters and person parameters. By conditioning the likelihood on the sufficient person raw score, item parameters can be estimated without estimating person parameters (Mair, Hatzinger, & Maier, 2018, p. 2).

Several diagnostic tools to evaluate the quality of a Rasch scale are provided in the package *eRm*. Reliability in a Rasch model is estimated as *person separation reliability* R_p (Bond & Fox, 2007). It indicates how well persons can be differentiated on the measured variable by estimating the "replicability of person placement across other items measuring the same construct" (p. 284). It is based on the same logic as Cronbach's alpha and calculated by dividing the amount of variance that can be reproduced by the Rasch model (i.e., total observed variance minus error variance) by the total amount of observed variance. Hence, it indicates the proportion of person variance that is not due to error. Values are bound by 0 and 1. Different statistical software can yield different values for person separation reliability due to employing different estimation methods. In the package *eRm,* the first step is to estimate item parameters using a conditional maximum likelihood framework, with missing values handled as separate groups. In a second step, person parameters are computed using unconditional maximum likelihood (UML) or joint maximum likelihood (JML) estimation. Item parameters are assumed to be known from the first step. This estimation procedure results in rather low values for separation reliability compared to, for example, estimates based on the expected a posteriori (EAP) measure. The authors note that "the concept of reliability and associated problems are fundamentally different between IRT and CTT (classical test theory). Separation reliability is more like a workaround to make the 'change' from CTT to IRT easier for users by providing something 'familiar.' Hence, we recommend not to put too much emphasis on this particular measure and use it with caution" (Mair, Hatzinger, Maier et al., 2018, p. 73). They do not provide any rule of thumb about which value of separation reliability should be regarded as satisfactory. However, I will report separation reliability and compare it with values from prior studies in order to provide an impression of how my studies' measures compare.

In addition to separation reliability, *item fit* and *person fit* are evaluated for Rasch scales (Bond & Fox, 2007, p. 238). The estimation of fit indicates by how much the actual response pattern deviates from Rasch model expectations. Fit is usually expressed either as mean square fit statistics or as standardised *t* fit statistics and categorised into a) *outfit* (i.e., average of standardised residual variance, thus emphasising unexpected responses far from an item's or a person's measure) and b) *infit* (i.e., standardised residuals are weighted by their individual variance, thus emphasizing unexpected values near an item's or a person's measure). The infit value is regarded as more relevant for identifying misfitting items and persons, and I will thus focus on it in my analyses and interpretations.

The expected value of *mean square infit and outfit* is 1, and actual values can range from 0 to positive infinity. A value of 1+x implies 100x% more variation in the data than predicted by the Rasch model (e.g., a mean square infit of 1.20 indicates 20% more variation). This happens when a capable person unexpectedly cannot answer easier items or when a less capable person solves harder items than expected. This kind of deviation from model expectations is called *underfit*. In the probabilistic Rasch model, a certain amount of variation is expected and thus conforms to the model. A fit value below 1 indicates less variation in the data than expected and, hence, a response pattern that is closer to a Guttman-style response string (i.e., all items which are easier than the person's ability are answered correctly, while all items which are more difficult are answered incorrectly). This kind of deviation from the model is called *overfit*. While underfit informs us about quality restraints on our measures, "overfitting performances might mislead us into concluding that the quality of our measures is better than it really is. In many practical measurement situations in the human sciences, it is quite likely that overfit will have no practical implications at all. The technical implications are smaller standard errors and inflated reliability" (Bond & Fox, 2007, p. 240).

Fit statistics can be used to detect problematic items and person performances. Item omission can also be considered. However, it has to be kept in mind that omitting the overfitting items "could rob the test of its best items" (p. 241). Hence, omission is usually considered for underfitting items instead. Even though Bond and Fox caution against strict rules concerning misfit, they propose a rough guideline for determining unacceptable departures from the value of 1 according to sample size: For samples smaller than 500, values above 1.3 can be regarded as misfits; for samples between 500 and 1000, values above 1.2; and for samples larger than 1000, values above 1.1 (p. 286).

Infit and outfit statistics can also be reported in a standardised form. The expected mean of *standardised t infit and outfit* values is 0 with a standard deviation of 1. While negative values indicate less variation than modelled (i.e., overfit), positive values indicate more variation (i.e., underfit). A recommended cut-off for underfit is +1.96 (i.e., $p < .05$). The t fit statistics are mostly considered when evaluating person misfit. A rule of thumb can be that a satisfactory model should fit for at least 95% of the sample. Thus, person t infit should be above 1.96 for no more than 5% of the sample.

3.3.5 Analyses of variance

For manipulation checks and additional analyses in Study 2 and Study 3, I conducted analyses of variance. I used the *R* package *car* (Fox, J. et al., 2018) for univariate (ANOVA) and multivariate analyses of variance (MANOVA).

ANOVA and its *F*-statistic are based on the assumptions of normally distributed data, statistical independence of the observations, a dependent variable measured at interval level, and homogeneity of variance. All assumptions were met for all models unless noted otherwise. If all assumptions were not met, corrective measures are addressed. Homogeneity of variance can be tested by conducting Levene's test, which should be nonsignificant. ANOVA is fairly robust to violations of this assumption if sample sizes are equal. Still, in case the assumption is not met, the adjusted Welch's F can be considered (Field et al., 2012, pp. 412–414). Moreover, several robust tests and corresponding *R* functions are provided by Rand Wilcox on his website (Wilcox, 2005).

There are four common test statistics in MANOVA: Pillai's trace V, Hotelling's T^2, Wilk's lambda, and Roy's largest root (for details, see Field et al., 2012, p. 715). I will report Pillai's trace as it is most powerful if differences between groups are theoretically assumed for more than one variate. MANOVA is based on the assumptions of statistical independence of the observations, randomly sampled data at the interval level, multivariate normality (i.e., dependent variables collectively have a multivariate normality within groups), and homogeneity of covariance matrices (i.e., correlation between any two dependent variables is equal in all groups). All assumptions were met in all models unless noted otherwise. If all assumptions were not met, corrective measures are addressed.

The assumption of multivariate normality can be tested by conducting a multivariate Shapiro-Wilk test using the *R* package *mvShapiroTest* (Gonzalez-Estrada & Villasenor-Alva, 2013). This test should be nonsignificant. In case the assumption is not met, several robust tests based on ranking the data and corresponding *R* functions are provided by Rand Wilcox on his website (Wilcox, 2005). I conducted robust MANOVA based on Munzel and Brunner's method using the *mulrank*() function and Choi's and Marden's robust test, which is an extension of the Kruskall-Wallis test, using the *cmanova*() function (Field et al., 2012, p. 733). Here, the data need to be reshaped, for which I used the *R* package *reshape* (Wickham, 2017). However, these tests can be used only for one-factorial designs (i.e., Study 2 but not Study 3). Field et al. (2012) state that "for more complex designs you should accept defeat" (p. 733) and hence use the non-robust methods. As Pillai's trace is relatively robust to violations of multivariate normality (p. 719), I will thus report classic MANOVA results in Study 3.

The assumption of homogeneity of covariance matrices is sometimes tested using Box's test, which should be nonsignificant if matrices are the same. However, Box's test is susceptible to violations of the assumption of multivariate normality and tends to be significant in large samples even in the case of relatively similar covariance matrices. Moreover, if sample sizes are equal, Box's test is usually disregarded because it is unstable and Hotelling's and Pillai's statistics are robust. Pillai's trace is the most robust of the four test statistics to violations of assumptions. Due to questions about its use, Box's test is not implemented in *R* yet. I did not conduct it as sample sizes are perfectly equal in Study 2 and almost equal in Study 3 (Field et al., 2012, p. 718). Following the MANOVAs, I conducted ANOVAs including a Bonferroni correction to protect against inflated Type I error rates (i.e., α-level divided by the number of tests conducted).

4. Study 1: Online survey

This online survey study was conducted between April 28 and May 18, 2016 with German participants recruited by the panel provider Bilendi. The expenses for the panel provider were covered with my personal means.

4.1 Background

4.1.1 Specific aims of the study

This first correlational study was designed with the following aims:

- I sought to test a path model reflecting the process through which perceived communicated socio-spatial distance in news coverage might influence climate protective behaviour and climate change knowledge (i.e., through people's psychological socio-spatial distance of climate change and the relevance they attribute to the issue).
- In this study, I assessed both personal and societal relevance attributed to the climate change issue in order to see whether the relations differ (Weber & Wirth, 2013).
- Moreover, I aimed to test the construct validity and reliability of my scales in a sample varying in age and educational background.

4.1.2 Main research questions and hypotheses

The research questions and hypotheses examined are listed below (see Figure 10). Relations are formulated in the opposite direction as the general formulation in Chapter 3.1, because I investigated *perceived communicated distance* in existing news coverage here, while in Study 2 and Study 3, I will examine the effect of proximising climate change. Global identity salience, which is addressed in the general hypotheses H7 and H9, was not investigated here, only in Study 3.

H1.1: Perceived communicated socio-spatial distance of climate change in news coverage positively predicts recipients' *psychological socio-spatial distance* of climate change.

H1.2: Perceived communicated socio-spatial distance of climate change in news coverage negatively predicts the *relevance attributed to the climate change issue* indirectly through higher psychological socio-spatial distance of climate change.

H1.3: Perceived communicated socio-spatial distance of climate change in news coverage negatively predicts *climate protective behaviour* indirectly through higher psychological socio-spatial distance of climate change and lower relevance attributed to the climate change issue (serial indirect relation).

H1.4: Perceived communicated socio-spatial distance of climate change in news coverage negatively predicts *climate change knowledge* in the form of climate system knowledge and climate protective behavioural knowledge indirectly through higher psychological socio-spatial distance of climate change and lower relevance attributed to the climate change issue (serial indirect relation).

H1.5: Climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge is positively related to climate protective behaviour.

RQ1.1: Is the relation with climate protective behaviour different for climate system knowledge compared to climate protective behavioural knowledge?

H1.6: Individuals' *global identity as a trait* (i.e., the dimensions *global self-definition* and *global self-investment*) positively predicts a) the relevance attributed to the climate change issue, b) climate protective behaviour, and c) climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge.

H1.8: The relation between the psychological socio-spatial distance of climate change and the relevance attributed to the climate change issue is moderated by individuals' global identity (i.e., the dimensions global self-definition and global self-investment). The more people identify with people all over the world (global self-definition) and the more they care about their well-being (global self-investment), the smaller the relation (i.e., people who only weakly identify with and care little about people all over the world will evaluate climate change as more relevant when their psychological socio-spatial distance is lower, while it will not make a difference or at least a smaller difference for people who strongly identify with and care a lot about people all over the world).

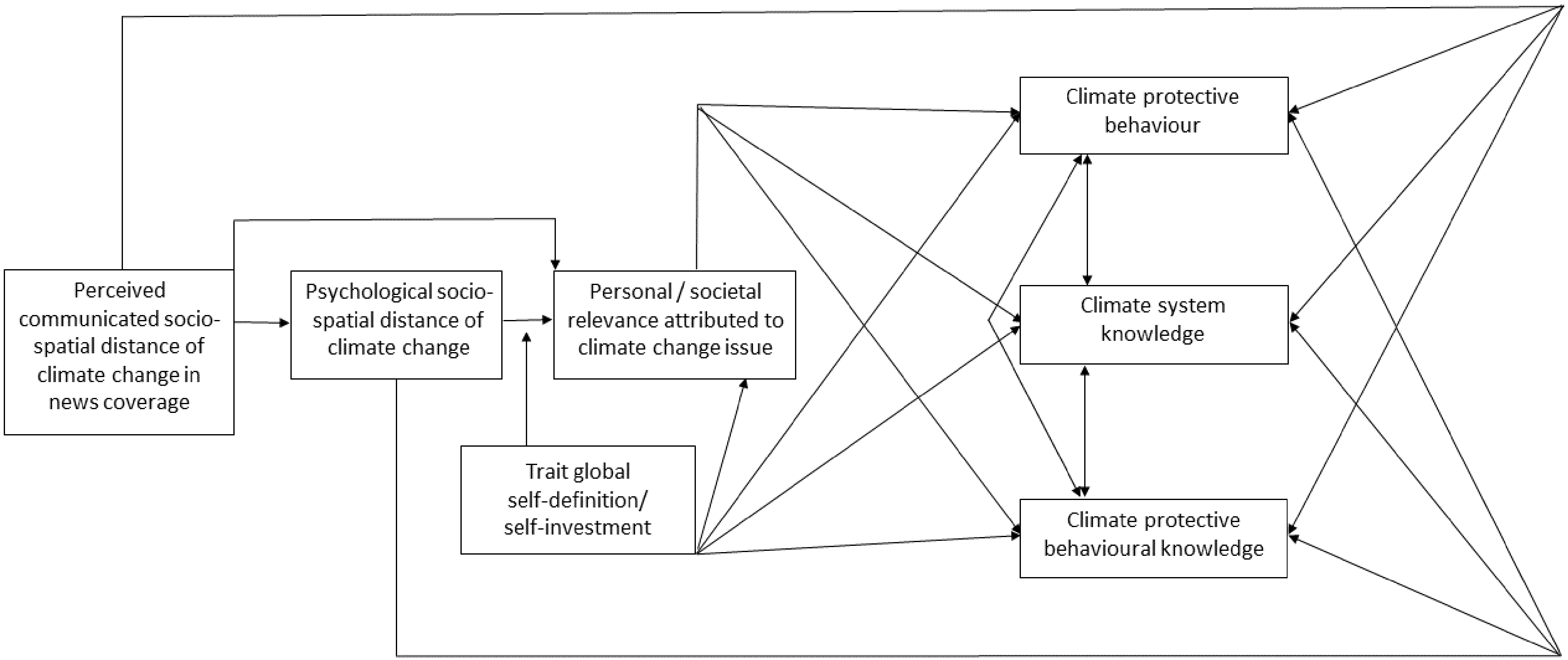


Figure 10. Overview of models examined in Study 1.

4.1.3 Additional research question

In an additional research question, I asked whether people's frequency of contact with the climate change issue in communication (i.e., through media or direct encounters) is associated with their psychological socio-spatial distance of climate change. If contact with the climate change issue in communication is related to psychological socio-spatial distance, this might indicate that communication participants received in the past tended to focus on distant consequences of climate change and that this might have contributed to their psychological socio-spatial distance. Moreover, I also examined whether contact with the climate change issue in communication is related to the other study outcomes.

RQ1.2: Is contact with the climate change issue in communication related to a) recipients' psychological socio-spatial distance of climate change, b) the relevance attributed to the climate change issue, c) climate protective behaviour, and d) climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge?

4.2 Method

4.2.1 Participants

To determine the desired sample size, I used the *N:q* rule as a rough guideline. This refers to the ratio of the sample size (N) to the number of parameters that are estimated in a SEM (q). A recommended ratio would be 20:1, 10:1 would be a less ideal but still acceptable ratio (Kline, 2016, p. 16; see also Jackson, 2003). In the planned moderated path model, q = 17 regression parameters need to be estimated. Hence, a ratio of 20:1 would require a sample size of N = 340. To have some flexibility to increase model complexity, I decided to recruit a sample of approximately 500 participants. I commissioned the panel provider Bilendi (www.bilendi.de) to recruit participants. With the consent of the panel provider, I excluded participants who answered the questionnaire too quickly, defined as at least two standard deviations faster than the median response time. This led to an exclusion of n = 16 participants.[3] In order to obtain

[3] Several quality checks have been suggested for online research. However, research on their effectiveness and pros and cons is rather scarce. Referring to the recommendations by Leiner (2013), which are based on research conducted with the SoSci Panel, I decided to only exclude participants due to not finishing the study and due to speeding. To calculate the median response length, I used the variable TIME_SUM provided by the software SoSci Survey. This variable represents the sum of the duration on each site corrected for interruptions. An interruption is defined as a duration of more than two hours for a site as well as a duration exceeding the median duration for the respective site by more than three standard deviations (see https://www.soscisurvey.de/help/doku.php/de:results:variables#antwortzeiten).

a varied sample and to mirror relevant demographic characteristics of the German population, I applied a quota procedure with cross quotas for age group and gender as well as quotas for school education levels based on the 2011 German census.[4] The final sample consisted of N = 498 participants (n = 257 females, M = 48.7 years of age, SD = 17.0; see Table 3).[5]

Table 3. Demographic characteristics of the sample in Study 1 resulting from the quota procedure compared to the German population

	Proportion in sample (%)	Proportion in population [a] (%)
Gender		
Female	51.6	51.6
Male	48.4	48.4
Age group females		
18 to 29 years	16.0	16.2
30 to 49 years	32.7	32.7
50 to 64 years	23.7	23.8
> 65 years	27.6	27.4
Age group males		
18 to 29 years	17.0	17.8
30 to 49 years	35.3	35.5
50 to 64 years	25.3	24.9
> 65 years	22.4	21.7
School education		
No diploma/still in school	3.6	5.0
Secondary education certificate (~ 9 years)	36.3	36.6
General secondary education certificate (~ 10 years)	29.1	29.0
Higher education entrance certificate (~ 12-13 years)	30.9	29.4

Note. [a] Based on the census 2011.

[4] Retrieved from https://ergebnisse.zensus2011.de/#dynTable:absRel=ANZAHL;ags=00;agsAxis=X. Note that even though a quota sample mirrors the population in relevant characteristics, it cannot be called a representative sample. Representativeness can only be assumed for randomly selected samples. Therefore, conclusions about the distribution of assessed characteristics in the German population cannot be drawn on the basis of this study. Its main aim is rather to examine relations between these characteristics. In order to gain confidence in the generalisability of the findings, replications with diverse samples as well as representative samples will be necessary.

[5] Due to a programming mistake in the quota syntax at the start of the recruitment period, too many participants with a high education level were admitted. These n = 71 cases were excluded from the data analyses. The small deviations between the quota requirements and the actual sample arose because participants are only counted for the quota when they have finished the study. If several participants participate at the same time, the quota can be exceeded. The quota for low education is most difficult for the panel provider to fill. Even after several trials, the panel provider was not able to complete it and I agreed to end recruitment.

Professional training had been completed by $n = 353$ participants, a university degree by $n = 133$. In terms of their current main professional activity, $n = 24$ were still in school, $n = 19$ were pursuing training, $n = 12$ were university students, $n = 199$ were non-self-employed, $n = 145$ self-employed, $n = 24$ retired, $n = 40$ unemployed/seeking work, $n = 28$ looking after the house/children, and $n = 7$ named another status. All participants currently lived in Germany.

4.2.2 Design and procedure

The survey was programmed with the software package SoSci Survey (www.soscisurvey.de). The study was announced as a survey on different questions regarding climate change. Following Tobler et al. (2012, p. 193), I included the explanation that "the term climate change in the survey refers to the recent worldwide changes in the climate within the last 250 years (since industrialisation) and not fluctuations over the entire geological history (such as glacial periods and warm intervals)." In order to check for eligibility and apply the quota sampling, I first asked for participants' age, gender, country of residency, and education, followed by occupation.

Participants then answered questions in the outlined order on the psychological distance of climate change, the relevance attributed to the climate change issue, climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge, climate protective behaviour, the perceived communicated distance of climate change in news coverage, their contact with climate change-related communication via diverse channels, and social identity, including global identity.[6]

4.2.3 Measures

In this section, I describe the scales used in the survey and provide example items translated into English. A full list of the German items can be found in Appendix 1. Table 4 provides an overview of the main scale characteristics.

[6] The study additionally included a measure of informational and epistemic self-efficacy regarding climate change after the relevance measure, which was assessed for a research question not covered here.

Table 4. Psychometric properties of the measures used in Study 1

Variable	*n*	*M*	*SD*	range	items	α	ω	AVE	R_P	r_S
Perceived communicated socio-spatial distance of climate change in news coverage	498	4.28	1.33	1.00–7.00	2	-	-	-	-	.62
Psychological distance of climate change (4-dim)	498	3.93	1.16	1.00–7.00	14	.90	.95	.72	-	-
Psychological socio-spatial distance of climate change	498	3.88	1.60	1.00–7.00	8	.95	.97	.82	-	-
Relevance attributed to the climate change issue										
Personal relevance	497[b]	5.57	1.40	1.00–7.00	4	.95	.95	.83	-	-
Societal relevance	497[b]	5.63	1.44	1.00–7.00	4	.96	.96	.86	-	-
Climate system knowledge [a]	498	0.02	1.57	-4.32–4.30	21	.84	-	-	.88	-
Climate protective behavioural knowledge [a]	498	0.23	1.68	-3.44–3.77	7	.65	-	-	.65	-
Climate protective behaviour [a]	488[c]	-0.34	0.88	-3.54–2.60	35	.74	-	-	.73	-
Global identity										
Dimension global self-definition	497[b]	2.61	0.94	1.00–5.00	4	.88	.88	.65	-	-
Dimension global self-investment	497[b]	3.31	1.01	1.00–5.00	4	.88	.88	.65	-	-

Note. The displayed mean scores, standard deviations, and ranges of the scales analysed according to classical test theory are based on raw scores instead of the factor scores used in the later models. As factor scores are centred around 0, the raw scores give a better impression of how participants answered the scales with regard to the answer format used. [a] Results are based on Rasch analyses. [b] One case with missing values was excluded. [c] 10 cases with missing values for all variables were excluded.

4.2.3.1 Perceived communicated distance of climate change in news coverage

In order to assess the perceived communicated distance of climate change in news coverage, four items with a 7-point semantic differential were included: "News coverage on climate change is mainly about… people like me – other people" (perceived communicated social distance, M = 4.11, SD = 1.54, range = 1 – 7.); "close locations – far locations" (perceived communicated spatial distance, M = 4.45, SD = 1.41, range = 1 – 7); "the present – the future" (perceived communicated temporal distance, M = 5.42, SD = 1.47, range = 1 – 7); "certain facts – uncertain opinions" (perceived communicated hypothetical distance, M = 3.77, SD = 1.49, range = 1 – 7). Spearman's rho for the association between the social and spatial distance items was r_S = .62, which can be interpreted as a reliability estimate for a 2-item scale analogous to Cronbach's alpha (Eisinga, Grotenhuis, & Pelzer, 2013). I built a mean score for *perceived communicated socio-spatial distance of climate change in news coverage* to be included in the models (M = 4.28, SD = 1.33, range = 1.00 – 7.00).

4.2.3.2 Psychological distance of climate change

The measure used to assess psychological distance comprised a fully labelled Likert scale ranging from 1 (*fully disagree*) to 7 (*fully agree*) for all items. Psychological social distance was measured with four items ("Climate change has serious consequences mainly for others", "Mainly people I do not know experience impacts of climate change", "Climate change is a significant problem mainly for others", "Mainly people I do not know are confronted with impacts of climate change"; M = 3.90, SD = 1.68, range = 1.00 – 7.00). Psychological spatial distance was also measured with four items ("Climate change has serious consequences mainly in far locations", "The climate change issue makes me think of remote countries", "Climate change is a significant problem mainly in distant locations", "Mainly distant countries experience consequences of climate change", M = 3.86, SD = 1.73, range = 1.00 – 7.00). Psychological temporal distance was measured with three items ("The climate change issue makes me think of the future", "Only in the future will climate change have serious consequences", "Climate change will be a significant problem only in the future"; M = 4.56, SD = 1.36, range = 1.00 – 7.00). Psychological hypothetical distance was measured with three items (e.g., "I am uncertain whether climate change really exists", "There is little agreement in science about climate change", "It is uncertain what the effects of climate change are"; M = 3.45, SD = 1.23, range = 1.00 – 7.00).

The measure was based on the scales developed by Spence et al. (2012) and Jones et al. (2017). The items were translated into German and selected and adapted with regard to the following goals: First, I aimed to avoid confounding the dimensions through wording. I excluded the word "likely" in items measuring psychological social, spatial, and temporal distance as it implies hypotheticality. Moreover, I used the future tense only in items measuring psychological temporal distance and not in items measuring the other dimensions. Finally, I did not include items on developing countries (as here, psychological social and spatial distance are confounded) or future generations (as here, psychological social and temporal distance are confounded). Second, I aimed to avoid confounding the measure with implicit severity differences (i.e., people might automatically think that distant challenges are more severe, see Spence & Pidgeon, 2010) by explicitly including severity in the wording. Third, I paid close attention to avoiding confounding the measure with the relevance measure by eliminating any overlap in wording. I only used wording related to distance rather than balancing items for perceived distance and proximity in order to avoid a method factor (i.e., when wording in two directions is balanced, factor analyses usually result in two dimensions not due to conceptually distinct contents but due to the mere similarity of positive versus negative wording; see e.g., Lindwall et al., 2012).

Psychological distance of climate change. A CFA of the 4-dimensional model with a second-order factor (i.e., psychological distance) yielded satisfactory model fit, $\chi^2(73)$ = 226.63, p < .001; CFI = .96; TLI = .95; RMSEA = .065, 90% CI [.057, .073] (robust RMSEA = .077, 90% CI [.066, .088]); SRMR = .046. However, the temporal and hypothetical dimensions did not load optimally on the superordinate factor (.45 and .34, respectively), and three items had factor loadings ≤ .61. All other loadings of the scale were ≥ .76 and hence satisfactory. Cronbach's alphas were α = .93, .97, .74, and .69, omegas ω = .93, .97, .82, and .70, and AVE = .76, .88, .63, and .43, respectively. These results were used to further improve the scale in Study 3.

Psychological socio-spatial distance of climate change. In my research questions and hypotheses, I focussed jointly on the dimensions of psychological social and spatial distance as the communication strategy of proximising climate change addresses these dimensions in a confounded way. Hence, I aimed to include a variable reflecting both in my analyses (i.e., psychological socio-spatial distance). However, at least three first-order factors are required to identify second-order CFA models (Kline, 2016, p. 19).[7] Models with only two first order factors are thus calculated as models in which the two factors correlate.[8] The CFA of the 2-dimensional model (psychological social and spatial distance) yielded satisfactory model fit, $\chi^2(19) = 56.45$, $p < .001$; CFI = .98; TLI = .97 (robust TLI = .98); RMSEA = .063, 90% CI [.049, .077] (robust RMSEA = .086, 90% CI [.061, .113]); SRMR = .024. Factor loadings were .76, .90, .89, and .93 for social distance and .90, .91, .96, and .97 for spatial distance, and hence all satisfactory. The covariance between the two dimensions was .80. Cronbach's alphas were α = .93 and .97, omegas ω =.93 and .97, and AVE = .76 and .88, respectively. I thus calculated the mean of the factor scores for the dimensions of psychological social and spatial distance and used it as an indicator of *psychological socio-spatial distance of climate change* in the model for examining my research questions.

4.2.3.3 Relevance attributed to the climate change issue

Based on questions used by Weber and Wirth (2013) and Spence and Pidgeon (2010), I asked for participants' view on the topic of climate change. I differentiated between personal and societal relevance in order to examine whether these two aspects differed. Participants answered four questions for each dimension on a 7-point semantic differential: "The topic of climate change is for me personally/societally … uninteresting – interesting, unimportant – important, irrelevant – relevant, meaningless – meaningful" (personal relevance attributed to the climate change issue: M = 5.57, SD = 1.40, range = 1.00 – 7.00; societal relevance attributed to the climate change issue: M = 5.63, SD = 1.44, range = 1.00 – 7.00; note that the distribution is rather skewed). One participant was excluded from the analyses due to missing values. Personal and societal relevance attributed to the climate change issue correlated strongly and positively (r_P = .55, p < .001).

In terms of raw mean scores, personal relevance attributed to the climate change issue had no relation with the psychological social distance of climate change (r_P = -.05, p = .286) and a small negative relation with the psychological spatial distance of climate change (r_P = -.09, p = .038). Societal relevance attributed to the climate change issue also had no

[7] The specification of the superordinate factor as the common cause of first-order factors implies that the superordinate factor explains why the first-order factors covary. The second direct cause of the first-order factors is disturbance, which represents variation not explained by the superordinate factor. The disturbance variances may be underidentified with only two first-order factors.
[8] I also calculated a 1-dimensional model, which did not result in satisfactory model fit.

relation with the psychological social distance of climate change ($r_P < .01$, $p = .912$) and a small negative relation with the psychological spatial distance of climate change ($r_P = -.11$, $p = .016$). This indicates that the relevance attributed to the climate change issue and the psychological social and spatial distance of climate change can be regarded as different constructs (i.e., discriminant construct validity).

CFA for both 1-dimensional models yielded satisfactory model fit (personal relevance attributed to the climate change issue: $\chi^2(2) = 0.94$, $p = .626$; CFI = 1.00; TLI = 1.01; RMSEA = .000, 90% CI [.000, .000]; SRMR = .006; factor loadings: .93, .90, .93, .86; Cronbach's α = .95; ω = .95, AVE = .83; societal relevance attributed to the climate change issue: $\chi^2(2)$ = 0.60, $p = .739$; CFI = 1.00; TLI = 1.01, RMSEA = 0.00, 90% CI [.000, .000]; SRMR = .003; factor loadings: .93, .94, .94, .88; Cronbach's α = .96; ω = .96, AVE = .86). Hence, all psychometric properties were satisfactory.

4.2.3.4 Climate change knowledge

As a measure of climate change knowledge, I used the scale developed by Tobler et al. (2012) and revised by Shi et al. (2015), extended with items adapted from Kaiser and Frick (2002) and Frick et al. (2004). The original German items were provided by the authors. The measure comprised 17 correct and 17 incorrect statements.

Climate system knowledge. Climate system knowledge was assessed with seven items on CO_2 and the greenhouse effect (three correct and four incorrect statements from Shi et al., 2015; e.g., "The ozone hole is the main cause of the greenhouse effect", reverse-coded), seven items on climate change and its causes (five correct and two incorrect statements from Shi et al., 2015; e.g., "The 90s were globally the warmest decade during the past century"), and seven items on expected consequences of climate change (three correct and four incorrect statements from Shi et al., 2015; e.g., "For the next few decades, the majority of climate scientists expect an increase in extreme events, such as droughts, floods, and storms").

Climate protective behavioural knowledge. Climate protective behavioural knowledge was assessed with seven items on climate change-related actions (two correct and five incorrect statements from Kaiser & Frick, 2002, Shi et al., 2015, as well as one self-developed question; e.g., "To let in fresh air in winter, it is most climate friendly to keep a window open for a while", reverse-coded), and six items on the effectiveness of climate-related actions (four correct and two incorrect statements from Kaiser & Frick, 2002, Shi et al., 2015, and Tobler et al., 2012; e.g., "The production of meat and dairy products results in more CO_2 emissions per kg food than the production of vegetables").

All statements within a single domain were displayed in random order. They had to be evaluated as "true", "false", or "don't know". Unfortunately, only after study completion did I notice a programming mistake on the last page of the knowledge questionnaire that contained the questions on effectiveness knowledge. The answer categories were accidentally displayed in reverse order as "false", "true", and "don't know". Some participants noticed the switch and addressed it in their comments, expressing uncertainty about it. However, I have to assume that not all participants were aware of the switch and, hence, the items cannot reliably be used. Therefore, I did not use these items in the following analyses. The remaining 28 items were coded as 1 (*correct*) or 0 (*incorrect, don't know; M* = 15.79, *SD* = 6.17, range = 0 – 27).

A 1-dimensional Rasch analysis of all items resulted in a scale with a person separation reliability of R_p = .90. Item mean square infit values were between 0.80 and 1.18 and thus all below the recommended threshold of 1.20 for samples between 500 and 1,000 participants. The model did not fit the data of 29 participants well (5.8%), as indicated by person *t* infit values above 1.96. A descriptive analysis of the person parameters showed that items were well selected with regard to difficulty for this sample, as indicated by a mean value of the person parameters close to zero (M_θ = 0.03, *SD* = 1.31, range -4.65 – 3.90).

A separate analysis of *climate system knowledge* (21 items) resulted in a scale with a person separation reliability of R_p = .88. Item mean square infit values were between 0.82 and 1.12. The model did not fit the data of 23 participants well (4.6%). The mean value of the person parameters was M_θ = 0.02 (*SD* = 1.57, range -4.32 – 4.30).

A separate analysis of *climate protective behavioural knowledge* (7 items as the items on effectiveness knowledge could not be used) resulted in a scale with a person separation reliability of R_p = .65. Item mean square infit values were between 0.80 and 1.18. The model did not fit the data of eight participants well (1.6%). The mean value of the person parameters was M_θ = 0.23 (*SD* = 1.68, range -3.44 – 3.77).

4.2.3.5 Climate protective behaviour

The measure for climate protective behaviour was adapted from several versions of the GEB scale provided by the authors (e.g., Kaiser & Wilson, 2000). I selected 35 climate protective and climate damaging behaviours varying in difficulty. They included eight items on transport (e.g., “I fly within Germany”; “For travel in nearby areas (up to 30 km), I use public transport or a bicycle”), 10 items on energy use (e.g., “I use a clothes dryer”, “I leave appliances on standby (e.g., TV)”), 10 items on consumption/resource use (e.g., “I buy seasonal fruits and vegetables”, “I share appliances with others instead of buying new ones”), and seven items on social/political actions (“I boycott products of companies that demonstrably behave in a manner that damages the climate”, “I contribute financially to climate protection organisations”).

Participants indicated how often they conducted 25 behaviours on a scale with the answer options *never, seldom, once in a while, often, very often, cannot answer* (e.g., “I refrain from eating meat”). They indicated whether they conducted an additional 10 behaviours with *yes, no, cannot answer* (e.g., “I am member of a car-sharing pool”). Following Kaiser and Wilson (2000), the items on climate protective behaviours were recoded as 0 (*never, seldom, once in a while; no*), 1 (*often, very often; yes*), or missing (*cannot answer*), and items on climate damaging behaviours as 0 (*once in a while, often, very often; yes*), 1 (*never, seldom; no*), or missing (*cannot answer*). As was done in the GEB scale, I provided and explained the answer option *cannot answer* as actions that are not applicable to participants’ living situation (e.g., questions on driving behaviour if they do not have a driver’s license). Hence, I deliberately allowed missing values, as these can be handled by Rasch models. Nevertheless, ten people had to be excluded from the analysis as no person estimate could be determined due to missing values on too many variables. A 1-dimensional Rasch analysis of all items resulted in a scale with a person separation reliability of R_p = .73. Item mean square infit values were between 0.83 and 1.18 and thus all below the recommended threshold of 1.20 for samples between 500 and 1,000 participants. The model did not fit the data of 34 participants well (6.8%), as indicated by person t infit values above 1.96. This slightly exceeds the recommended threshold of 5% but is still reasonable. A descriptive analysis of the person parameters showed that items were well selected with regard to difficulty for this sample, as indicated by a mean value of the person parameters close to zero (M_Θ = -0.34, SD = 0.88, range -3.54 – 2.60).

4.2.3.6 Contact with the climate change issue in communication

Drawing upon measures used by Taddicken (2013) as well as Trepte, Loy, Schmitt, and Otto (2017), participants rated how often in the past they had come into contact with information about climate change in 13 media outlets as well as conversations and talks or events (for all outlets, see Table 5) on a fully labelled ordinal scale ranging from 1 (*never*) to 6 (*several times a week*). For the specific Internet outlets, I used a filter to exclude participants who indicated never having contact with climate change information via the Internet. I used the wording "contact with" in order to include not only active but also passive information consumption through habitual media use. Table 5 gives an overview of contact with the climate change issue in communication for the sample. I report the median rather than the arithmetic mean because the answer format was ordinally scaled. I built a sum score for media contact out of the nine media channels (Md = 26, range = 9 – 54, n = 461).

Table 5. Contact with the climate change issue in communication in Study 1

		1 *Never*	*2* *Once in half a year or less*	*3* *Several times in half a year*	*4* *Once a month*	*5* *Several times a month*	*6* *Several times a week*	
	Md [a]	*n*	*n*	*n*	*n*	*n*	*n*	*MV*
Private TV channels	3	79 (16%)	112 (22%)	139 (28%)	71 (14%)	77 (15%)	16 (3%)	4 (1%)
Public TV channels	3	49 (10%)	78 (16%)	141 (28%)	84 (17%)	118 (24%)	25 (5%)	3 (1%)
Radio	3	96 (19%)	97 (19%)	129 (26%)	70 (14%)	79 (16%)	21 (4%)	6 (1%)
Regional newspapers	3	98 (20%)	79 (16%)	131 (26%)	72 (14%)	90 (18%)	21 (4%)	7 (1%)
Supra-regional newspapers	3	142 (29%)	80 (16%)	123 (25%)	60 (12%)	71 (14%)	15 (3%)	7 (1%)
Weekly newspapers	2	153 (31%)	95 (19%)	111 (22%)	67 (13%)	56 (11%)	10 (2%)	6 (1%)
Brochures	2	165 (33%)	88 (18%)	98 (20%)	76 (15%)	49 (10%)	17 (3%)	5 (1%)
Academic journals	2	170 (34%)	83 (17%)	86 (17%)	81 (16%)	56 (11%)	15 (3%)	7 (1%)
Internet	3	58 (12%)	79 (16%)	125 (25%)	84 (17%)	98 (20%)	44 (9%)	10 (2%)
Online newspapers	2	198 (40%)	78 (16%)	106 (21%)	53 (11%)	48 (10%)	12 (2%)	3 (1%)
Social media	2	234 (47%)	83 (17%)	67 (13%)	40 (8%)	53 (11%)	18 (4%)	3 (1%)
Video-sharing websites	1	263 (53%)	80 (16%)	68 (14%)	42 (8%)	31 (6%)	12 (2%)	2 (0%)
Discussion platforms	1	268 (54%)	68 (14%)	69 (14%)	42 (8%)	38 (8%)	8 (2%)	5 (1%)
Talks or events	2	223 (45%)	90 (18%)	85 (17%)	58 (12%)	28 (6%)	10 (2%)	4 (1%)
Conversations with others	3	77 (15%)	100 (20%)	155 (31%)	87 (17%)	58 (12%)	17 (3%)	4 (1%)

Note. MV = missing values. [a] I report the median rather than the arithmetic mean because the scale's answer format was ordinal.

4.2.3.7 Social identity, including global identity

To measure global identity, I used the German translation of the *Identification with all Humanity Scale* (McFarland et al., 2012, see Table 1) by Reese et al. (2015). It consisted of nine items with four response levels (e.g., "How close do you feel to each of the following groups?"; "How much do you care if bad things happen to one of the following groups?"; People in my personal surroundings, Germans, Europeans, people all over the world). The level "Europeans" was included as an extension of the original scale. Answer options were provided on fully labelled 5-point Likert scales, for example, ranging from 1 (*not at all close*) to 5 (*very close*).

One participant was excluded from the analyses due to missing values. The items on people all over the world served as a measure for global identity. Similar to the results reported by McFarland et al. (2012), participants averaged a score of around three for identification with people all over the world (M = 2.92, SD = 0.90, range = 1.00 – 5.00, α = .93). The average level of identification increased with decreasing group level: identification with Europeans (M = 3.12, SD = 0.82, range 1.00 – 5.00, α = .91), identification with Germans (M = 3.44, SD = 0.73, range 1.00 – 5.00, α = .89), identification with people in one's personal surroundings (M = 3.97, SD = 0.77, range 1.22 – 5.00, α = .92). Identification with people all over the world was positively related to identification with Europeans (r_P = .85, p < .001), Germans (r_P = 54., p < .001), and people in one's personal surroundings (r_P = .37, p < .001) with decreasing strength.

A CFA of a 1-dimensional model for the nine global identity items did not yield satisfactory model fit, $\chi^2(27)$ = 318.48, p < .001; CFI = .87 (robust CFI = .88); TLI = .83 (robust TLI = .84); RMSEA = .147, 90% CI [.135, .161] (robust RMSEA = .164, 90% CI [.148, .180]); SRMR = .063. Factor loadings were between .67 and .87.; Cronbach's α = .93, ω = .93, AVE = .58.

However, following the analysis suggested by Reese et al. (2015), the CFA of the 2-dimensional model with correlating factors (items 1-4 for self-definition, items 6-9 for self-investment) yielded acceptable model fit, $\chi^2(19)$ = 78.88, p < .001; CFI = .97; TLI = .95 (robust TLI = .96); RMSEA = .080, 90% CI [.064, .096] (robust RMSEA = .088, 90% CI [.068, .109]); SRMR = .036. Factor loadings were .81, .82, .84, .75, for self-definition and .81, .77, .81, .84 for self-investment; Cronbach's α = .88 and .88, ω= .88 and .88, AVE = .65 and .65, respectively. The covariance of the two dimensions was .79. Hence, all psychometric properties were satisfactory and the results from this model were used in further analyses. Participants' global self-definition (M = 2.61, SD = 0.94, range = 1.00 – 5.00) was lower than their global self-investment (M = 3.31, SD = 1.01, range = 1.00 – 5.00).

4.3 Results

4.3.1 Main research questions and hypotheses

Before analysing the research questions and hypotheses, I calculated zero-order Pearson correlations to obtain an overview of the relations between the study variables without considering their interrelations, which are specified in the overall models (see Table 6). One person had to be excluded due to missing data on the relevance measures, one person due to missing data on the global identity measure, and 10 participants due to missing data on the behaviour measure, leaving a sample of n = 486.

Table 6. Zero-order correlations between the variables of Study 1

Variable	1	2	3a	3b	4	5	6	7a
1. Communicated socio-spatial distance of climate change in news coverage								
2. Psychological socio-spatial distance of climate change [a]	.36*							
3. Relevance attributed to the climate change issue								
3a. Personal relevance [a]	-.13*	-.10*						
3b. Societal relevance [a]	-.14*	-.08	.55*					
4. Climate system knowledge [b]	.01	-.06	.31*	.24*				
5. Climate protective behavioural knowledge [b]	-.04	-.17*	.16*	.17*	.68*			
6. Climate protective behaviour [b]	-.06	-.04	.34*	.30*	.23*	.21*		
7. Global identity								
7a. Dimension global self-definition [a]	-.09*	-.07	.39*	.30*	.11*	.07	.30*	
7b. Dimension global self-investment [a]	-.06	-.07	.44*	.36*	.17*	.13*	.37*	.85*

Note. [a] factor scores, [b] Rasch scores, * $p < .05$

I then calculated path models to examine all main research questions and hypotheses. To reduce model complexity and idiosyncratic influences of the variables (see Chapter 0), I used factor scores from the CFAs for psychological socio-spatial distance of climate change (centred mean of the two dimensions), personal and societal relevance attributed to the climate change issue, global self-definition and global self-investment, as well as the Rasch-based person estimates for climate protective behaviour, climate system knowledge, and climate protective behavioural knowledge. I first calculated models including the self-definition dimension of global identity. Here, in a first step, I calculated two unmoderated models including personal and societal relevance, respectively. In a second step, I included the interaction between psychological socio-spatial distance and global self-definition in these two models. Second, I calculated models including the self-investment dimension of global identity. Here, in a first step, I calculated two unmoderated models including personal and societal relevance, respectively. In a second step, I included the interaction between psychological socio-spatial distance and global self-investment in these two models.

4.3.1.1 Models including the self-definition dimension of global identity

Unmoderated models including global self-definition as predictor. I calculated unmoderated path models to test H1.1 to H1.6. The first model including the measure of personal relevance fit the data well, $\chi^2(1) = 0.72$, $p = .395$; CFI = 1.00; TLI = 1.01; RMSEA = .000, 90% CI [.000, .103]; SRMR = .008.[9] It explained 13.0% of the variance in psychological socio-spatial distance of climate change, 15.9% of the variance in personal relevance attributed to the climate change issue, 15.2% of the variance in climate protective behaviour, 9.9% of the variance in climate system knowledge, and 4.9% of the variance in climate protective behavioural knowledge.

The second model including the measure of societal relevance also fit the data well, $\chi^2(1) = 0.72$, $p = .395$; CFI = 1.00; TLI = 1.01; RMSEA = .000, 90% CI [.000, .103]; SRMR = .007. It explained 13.0% of the variance in psychological socio-spatial distance of climate change, 10.3% of the variance in societal relevance attributed to the climate change issue, 13.9% of the variance in climate protective behaviour, 6.5% of the variance in climate system knowledge, and 5.4% of the variance in climate protective behavioural knowledge. Figure 11 shows the standardised results for both models, which differed slightly in the size of the coefficients but not in the general pattern of relations.

[9] Due to specifying all theoretically plausible paths between variables, there is only one degree of freedom in the unmoderated models.

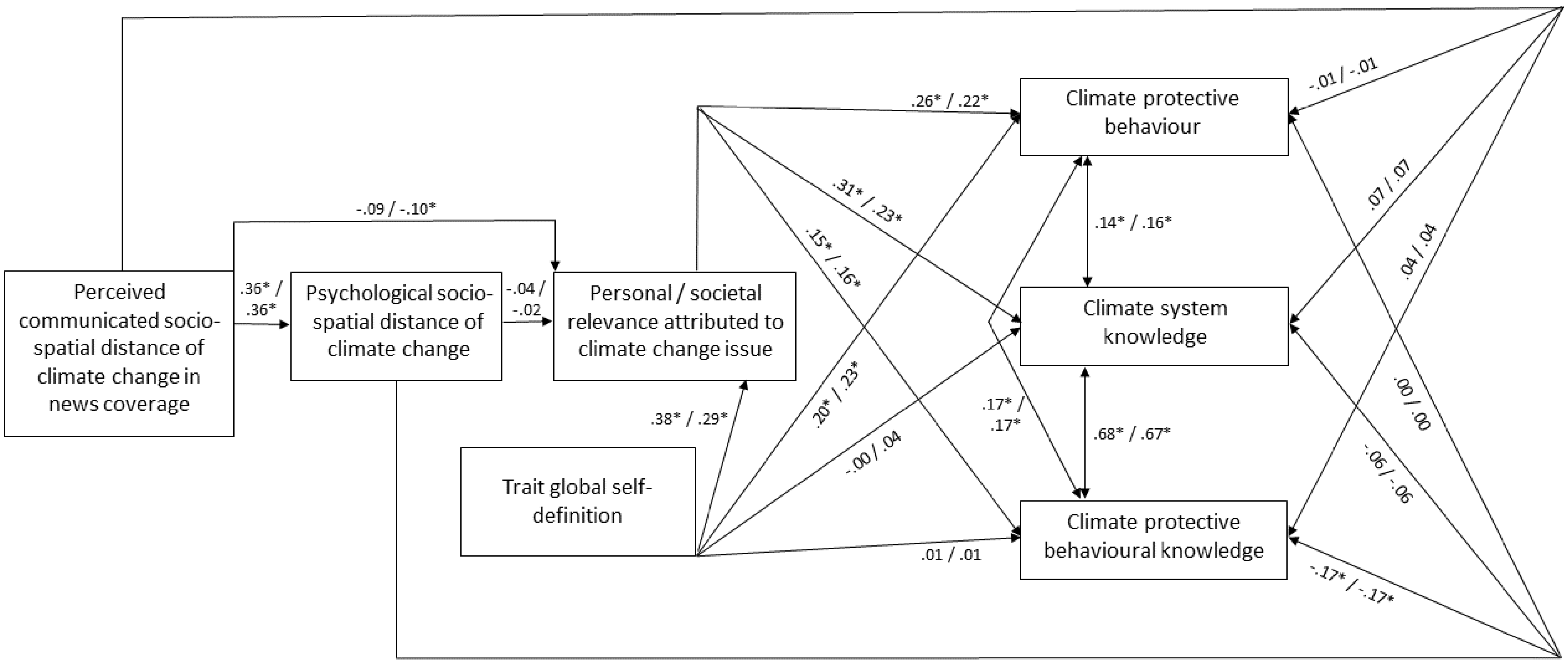


Figure 11. Unmoderated path models in Study 1 including the self-definition dimension of global identity and personal/societal relevance, respectively.

Note. Standardised coefficients are displayed. Relations between climate protective behaviour, climate system knowledge, and climate protective behavioural knowledge represent residual covariances. * $p < .05$.

In H1.1, I hypothesised that perceived communicated socio-spatial distance of climate change in news coverage positively predicts recipients' *psychological socio-spatial distance of climate change*. Confirming this assumption, the more participants perceived that news communicates climate change as socio-spatially distant, the higher their psychological socio-spatial distance of climate change (B = 0.39, SE = 0.05, 95% CI [0.28, 0.47], p < .001, β = .36, for the model including personal relevance; B = 0.39, SE = 0.05, 95% CI [0.30, 0.48], p < .001, β = .36, for the model including societal relevance).

In H1.2, I hypothesised that perceived communicated socio-spatial distance of climate change in news coverage negatively predicts the *relevance attributed to the climate change issue* indirectly through higher psychological socio-spatial distance of climate change. This assumption was not confirmed, as there was no indirect relation between perceived communicated socio-spatial distance and relevance attribution through psychological socio-spatial distance (p = .381, β = -.01, for the model including personal relevance; p = .596, β = -.01, for the model including societal relevance). However, the total negative relation between perceived communicated socio-spatial distance and relevance attributed to the climate change issue, including both the direct and indirect paths, was significant (total relation, B = -0.11, SE = 0.05, 95% CI [-0.19, -0.01], p = .025, β = -.10; no significant direct relation, B = -0.09, SE = 0.05, 95% CI [-0.19, 0.002], p = .073, β = -.09, for the model including personal relevance; B = -.12, SE = 0.05, 95% CI [-0.22, -0.02], p = .012, β = -.11; direct relation, B = -0.11, SE = 0.05, 95% CI [-0.22, -0.01], p = .030, β = -.10, for the model including societal relevance).

In H1.3, I hypothesised that perceived communicated socio-spatial distance of climate change in news coverage negatively predicts *climate protective behaviour* indirectly through higher psychological socio-spatial distance of climate change and reduced relevance attributed to the climate change issue (serial indirect relation). This assumption was not confirmed, as there was no indirect relation between perceived communicated socio-spatial distance and climate protective behaviour through psychological socio-spatial distance and relevance attribution (p = .392, β = -.00, for the model including personal relevance; p = .601, β = -.00, for the model including societal relevance). Moreover, there was also no total relation between perceived communicated socio-spatial distance and climate protective behaviour (i.e., including the direct path as well as the three indirect paths through 1) psychological socio-spatial distance, 2) relevance attributed to climate change, and 3) both sequentially; p = .440, β = -.03, for the model including personal relevance; p = .440, β = -.03, for the model including societal relevance).

However, climate protective behaviour was positively predicted by the personal relevance (direct relation, B = 0.17, SE = 0.03, 95% CI [0.11, 0.23], p < .001, β = .26) as well as societal relevance attributed to the climate change issue (direct relation, B = 0.14, SE = 0.03, 95% CI [0.08, 0.20], p < .001, β = .22).

In H1.4, I hypothesised that perceived communicated socio-spatial distance of climate change in news coverage negatively predicts *climate change knowledge* in the form of climate system knowledge and climate protective behavioural knowledge indirectly through higher psychological socio-spatial distance of climate change and reduced relevance attributed to the climate change issue (serial indirect relation). This assumption was not confirmed. There was no indirect relation between perceived communicated socio-spatial distance and *climate system knowledge* through psychological socio-spatial distance and relevance attribution (p = .398, β = -.00, for the model including personal relevance; p = .601, β = -.00, for the model including societal relevance). Moreover, there was also no total relation between perceived communicated socio-spatial distance and climate system knowledge (i.e., including the direct path as well as the three indirect paths through 1) psychological socio-spatial distance, 2) relevance attributed to climate change, and 3) both sequentially; p = .615, β = .02, for the model including personal relevance; p = .615, β = .02, for the model including societal relevance).

However, climate system knowledge was positively predicted by the personal relevance (direct relation, B = 0.34, SE = 0.06, 95% CI [0.22, 0.45], p < .001, β = .31) as well as societal relevance attributed to the climate change issue (direct relation, B = 0.24, SE = 0.05, 95% CI [0.14, 0.34], p < .001, β = .23).

There was also no indirect relation between perceived communicated socio-spatial distance and *climate protective behavioural knowledge* through psychological socio-spatial distance and relevance attribution (p = .430, β = -.00, for the model including personal relevance; p = .609, β = -.00, for the model including societal relevance). Moreover, there was no total relation between perceived communicated socio-spatial distance and climate protective behavioural knowledge (i.e., including the direct path as well as the three indirect paths through 1) psychological socio-spatial distance, 2) relevance attributed to climate change, and 3) both sequentially; p = .326, β = -.04, for the model including personal relevance; p = .326, β = -.04, for the model including societal relevance).

However, I found a direct negative relation between the psychological socio-spatial distance of climate change and climate protective behavioural knowledge (B = -0.19, SE = 0.05, 95% CI [-0.28, -0.09], p < .001, β = -.17, for the model including personal relevance; B = -0.19, SE = 0.05, 95% CI [-0.29, -0.10], p < .001, β = -.17, for the model including societal relevance). Moreover, there was also a small indirect negative relation between perceived communicated socio-spatial distance and climate protective behavioural knowledge through psychological socio-spatial distance (B = -0.07, SE = 0.02, 95% CI [-.11, -.03], p = .001, β = -.06, for the model including personal relevance; B = -0.07, SE = 0.02, 95% CI [-0.12, -0.03], p < .001, β = -.06, for the model including societal relevance). Climate protective behavioural knowledge was positively predicted by the personal relevance (direct relation, B = 0.17, SE = 0.07, 95% CI [0.04, 0.30], p = .011, β = .15) as well as societal relevance attributed to the climate change issue (direct relation, B = 0.18, SE = 0.06, 95% CI [0.06, 0.29], p = .004, β = .16).

In H1.5, I hypothesised that climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge is positively related to climate protective behaviour. As the path model contains the residual covariances only, I additionally calculated bivariate correlations to test this hypothesis. Indeed, the more participants engaged in climate protective behaviour, the greater their climate system knowledge (r_P = .23, p < .001; B = 0.16, SE = 0.06, p = .005, ψ = .14, in the model including personal relevance; B = 0.19, SE = 0.06, p = .002, ψ = .16, in the model including societal relevance) as well as behavioural knowledge (r_P = .21, p < .001; B = 0.22, SE = 0.06, p < .001, ψ = .17, in the model including personal relevance; B = 0.22, SE = 0.06, p < .001, ψ = .17, in the model including societal relevance).

In RQ1.1, I asked whether the relation with climate protective behaviour is different for climate system knowledge compared to climate protective behavioural knowledge. The effect size of the relation between climate protective behaviour and system knowledge did not differ from its relation with behavioural knowledge ($t(484)_{\text{difference}}$ = 0.57, p > .05; see Field et al., 2012, p. 239).

In H1.6, I hypothesised that individuals' global self-definition predicts a) the relevance attributed to the climate change issue, b) climate protective behaviour, and c) climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge. Confirming H1.6a, the analysis revealed a positive relation between global self-definition and *relevance attributed to the climate change issue* (B = 0.62, SE = 0.08, 95% CI [0.47, 0.80], p < .001, β = .38, for the model including personal relevance; B = 0.51, SE = 0.08, 95% CI [0.34, 0.68], p < .001, β = .29, for the model including societal relevance).

In order to test H1.6b and H1.6c, I examined the total relations including both the direct paths and the indirect paths through relevance attribution. Confirming H1.6b, the stronger participants' global self-definition, the more *climate protective behaviour* they reported (total relation, B = 0.32, SE = 0.05, 95% CI [0.23, 0.41], p < .001, β = .30; direct relation, B = 0.21, SE = 0.05, 95% CI [0.12, 0.32], p < .001, β = .20; indirect relation, B = 0.11, SE = 0.02, 95% CI [0.06, 0.16], p < .001, β = .10, for the model including personal relevance; total relation, B = 0.32, SE = 0.05, 95% CI [0.23, 0.42], p < .001, β = .30; direct relation, B = 0.25, SE = 0.05, 95% CI [0.15, 0.35], p < .001, β = .23; indirect relation, B = 0.07, SE = 0.02, 95% CI [0.04, 0.11], p < .001, β = .07, for the model including societal relevance).

Partly confirming H1.6c, the stronger participants' global self-definition, the more *climate system knowledge* they had (total relation, B = 0.21, SE = 0.08, 95% CI [0.05, 0.35], p = .008, β = .11; no significant direct relation, B = -0.00, SE = 0.09, 95% CI [-0.18, 0.17], p = .952, β = -.00; indirect relation, B = 0.21, SE = 0.05, 95% CI [0.13, 0.31], p < .001, β = .11, for the model including personal relevance; total relation, B = 0.21, SE = 0.08, 95% CI [0.05, 0.37], p = .008, β = .11; no significant direct relation B = 0.09, SE = 0.08, 95% CI [-0.07, 0.25], p = .292, β = .05; indirect relation, B = 0.12, SE = 0.03, 95% CI [0.06, 0.19], p < .001, β = .07, for the model including societal relevance). For *climate protective behavioural knowledge,* the total relations were not significant, although there were small significant indirect relations (total relation, B = 0.12, SE = 0.09, 95% CI [-0.06, 0.29], p = .192, β = .06; no significant direct relation, B = 0.01, SE = 0.10, 95% CI [-0.19, 0.20], p = .904, β = .01; indirect relation, B = 0.11, SE = 0.04, 95% CI [0.03, 0.20], p = .013, β = .05, for the model including personal relevance; total relation, B = 0.12, SE = 0.09, 95% CI [-0.06, 0.30], p = .192, β = .06; no significant direct relation, B = 0.03, SE = 0.09, 95% CI [-0.16, 0.21], p = .756, β = .01; indirect relation, B = 0.09, SE = 0.03, 95% CI [0.03, 0.15], p = .006, β = .05, for the model including societal relevance).

Models including global self-definition as predictor and moderator. In order to test H1.8, I included the interaction between psychological socio-spatial distance and global self-definition in the models. This changes the interpretation of the relations between psychological socio-spatial distance and relevance attribution as well as between global self-definition and relevance attribution to conditional relations (i.e., relation between psychological socio-spatial distance and relevance attribution at an average level of global self-definition and relation between global self-definition and relevance attribution at an average level of psychological socio-spatial distance; see Figure 12). The first model including the measure of personal relevance fit the data well, $\chi^2(5) = 6.11$, $p = .295$; CFI = 1.00; TLI = .99; RMSEA = .021, 90% CI [.000, .065] (robust RMSEA = .024, 90% CI [.000, .076]); SRMR = .018. It explained 13.0% of the variance in psychological socio-spatial distance of climate change, 16.0% of the variance in personal relevance attributed to the climate change issue, 15.2% of the variance in climate protective behaviour, 9.9% of the variance in climate system knowledge, and 4.9% of the variance in climate protective behavioural knowledge.

The second model including the measure of societal relevance also fit the data well, $\chi^2(5) = 6.34$, $p = .274$; CFI = 1.00; TLI = .99; RMSEA = .024, 90% CI [.000, .066] (robust RMSEA = .026, 90% CI [.000, .078]); SRMR = .018. It explained 13.0% of the variance in psychological socio-spatial distance of climate change, 10.5% of the variance in societal relevance attributed to the climate change issue, 13.9% of the variance in climate protective behaviour, 6.4% of the variance in climate system knowledge, and 5.4% of the variance in climate protective behavioural knowledge.

In H1.8, I hypothesised that the relation between the psychological socio-spatial distance of climate change and the relevance attributed to the climate change issue is moderated by individuals' global self-definition. The stronger people's global self-definition, the smaller the relation should be. This assumption was not confirmed, as there was no interaction between psychological socio-spatial distance of climate change and global self-definition in predicting personal or societal relevance attributed to the climate change issue (ps $\geq .382$).

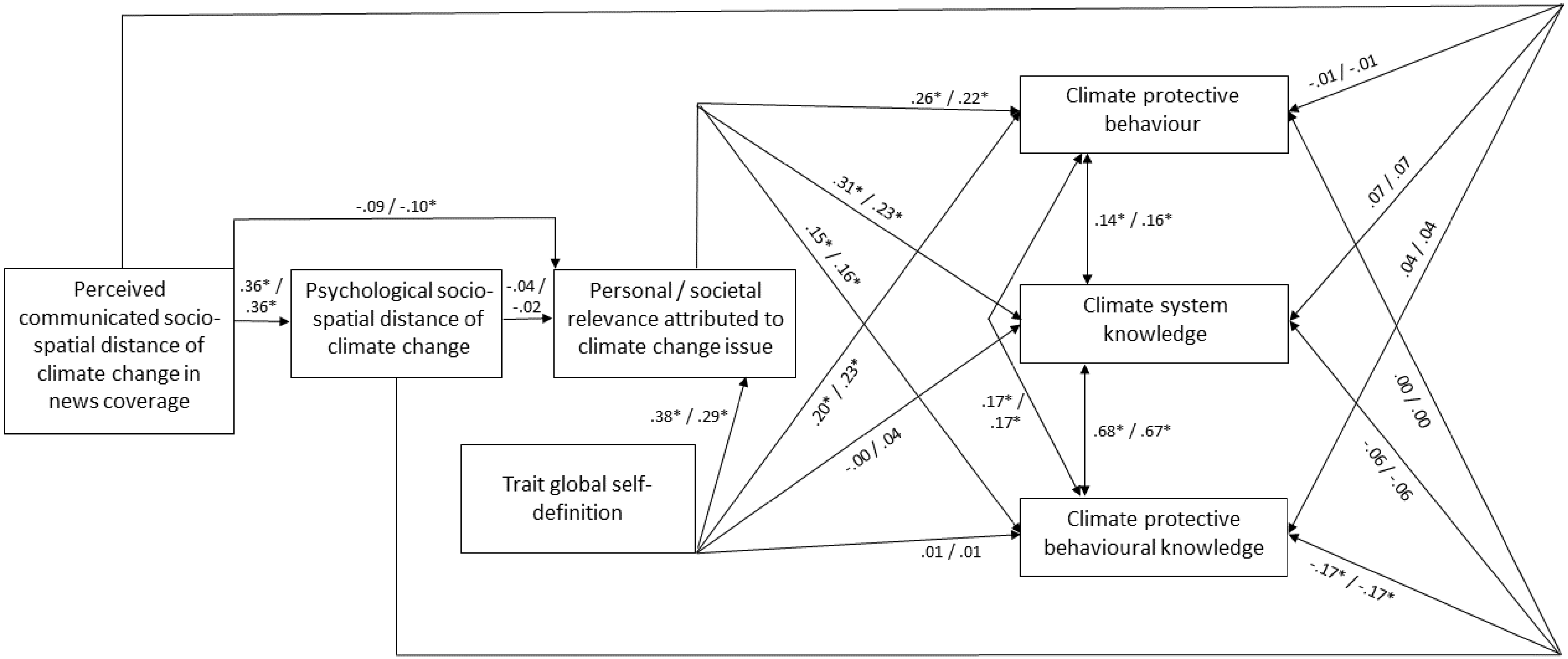


Figure 12. Moderated path models in Study 1 including the self-definition dimension of global identity and personal/societal relevance, respectively.

Note. Standardised coefficients are displayed. Relations between climate protective behaviour, climate system knowledge, and climate protective behavioural knowledge represent residual covariances. * $p < .05$.

4.3.1.2 Models including the self-investment dimension of global identity

Unmoderated models including global self-investment as predictor. The first model including the measure of personal relevance fit the data well, $\chi^2(1) = 1.24$, $p = .265$; CFI = 1.00; TLI = 0.99; RMSEA = .022, 90% CI [.000, .117] (robust RMSEA = .024, 90% CI [.000, .136]; SRMR = .010. It explained 13.0% of the variance in psychological socio-spatial distance of climate change, 20.7% of the variance in personal relevance attributed to the climate change issue, 17.8% of the variance in climate protective behaviour, 9.9% of the variance in climate system knowledge, and 5.2% of the variance in climate protective behavioural knowledge.

The second model including the measure of societal relevance also fit the data well, $\chi^2(1) = 0.72$, $p = .395$; CFI = 1.00; TLI = 1.01; RMSEA = .000, 90% CI [.000, .103]; SRMR = .007. It explained 13.0% of the variance in psychological socio-spatial distance of climate change, 10.3% of the variance in societal relevance attributed to the climate change issue, 13.9% of the variance in climate protective behaviour, 6.5% of the variance in climate system knowledge, and 5.4% of the variance in climate protective behavioural knowledge. Figure 13 shows the standardised results for both models, which differed slightly in the size of the coefficients but not in the general pattern of relations.

As the results for H1.1 to H1.5 and RQ1.1 were identical to those for the model including global self-definition, I do not outline them in detail (they minimally differed with regard to the value of some coefficients, but not their statistical significance, see Figure 11 and Figure 13).

In H1.6, I hypothesised that individuals' global self-investment predicts a) the relevance attributed to the climate change issue, b) climate protective behaviour, and c) climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge. Confirming H1.6a, the analysis revealed a positive direct relation between global self-investment and *relevance attributed to the climate change issue* ($B = 0.67$, $SE = 0.08$, 95% CI [0.52, 0.81], $p < .001$, $\beta = .43$, for the model including personal relevance; $B = 0.56$, $SE = 0.08$, 95% CI [0.40, 0.71], $p < .001$, $\beta = .35$, for the model including societal relevance).

In order to test H1.6b and H1.6c, I examined the total relations including both the direct paths and the indirect paths through relevance attribution. Confirming H1.6b, the stronger participants' global self-investment, the more *climate protective behaviour* they reported (total relation, B = 0.36, SE = 0.04, 95% CI [0.27, 0.45], p < .001, β = .37; direct relation, B = 0.27, SE = 0.05, 95% CI [0.17, 0.36], p < .001, β = .27; indirect relation, B = 0.09, SE = 0.02, 95% CI [0.05, 0.14], p < .001, β = .10, for the model including personal relevance; total relation, B = 0.36, SE = 0.04, 95% CI [0.28, 0.45], p < .001, β = .37; direct relation, B = 0.30, SE = 0.05, 95% CI [0.20, 0.39], p < .001, β = .30; indirect relation, B = 0.06, SE = 0.02, 95% CI [0.03, 0.10], p = .001, β = .06, for the model including societal relevance).

Confirming H1.6c, the stronger participants' global self-investment, the more *climate system knowledge* (total relation, B = 0.27, SE = 0.07, 95% CI [0.13, 0.42], p < .001, β = .16; no significant direct relation, B = 0.06, SE = 0.08, 95% CI [-0.13, 0.23], p = .470, β = .04; indirect relation, B = 0.21, SE = 0.05, 95% CI [0.12, 0.32], p < .001, β = .13, for the model including personal relevance; total relation, B = 0.27, SE = 0.07, 95% CI [0.14, 0.42], p < .001, β = .16; direct relation, B = 0.15, SE = 0.08, 95% CI [0.01, 0.31], p = .056, thus exceeding .05, β = .09; indirect relation, B = 0.12, SE = 0.03, 95% CI [0.06, 0.19], p < .001, β = .07, for the model including societal relevance) and *climate protective behavioural knowledge* they had (total relation, B = 0.21, SE = 0.08, 95% CI [0.05, 0.36], p = .009, β = .12; no significant direct relation, B = 0.12, SE = 0.10, 95% CI [-0.07, 0.31], p = .206, β = .07; indirect relation, B = 0.09, SE = 0.05, 95% CI [0.004, 0.19], p = .051, thus exceeding .05, β = .05, for the model including personal relevance; total relation, B = 0.21, SE = 0.08, 95% CI [0.06, 0.40], p = .009, β = .12; no significant direct relation, B = 0.13, SE = 0.09, 95% CI [-0.03, 0.31], p = .149, β = .07; indirect relation, B = 0.09, SE = 0.04, 95% CI [0.01, 0.16], p = .017, β = .05, for the model including societal relevance).

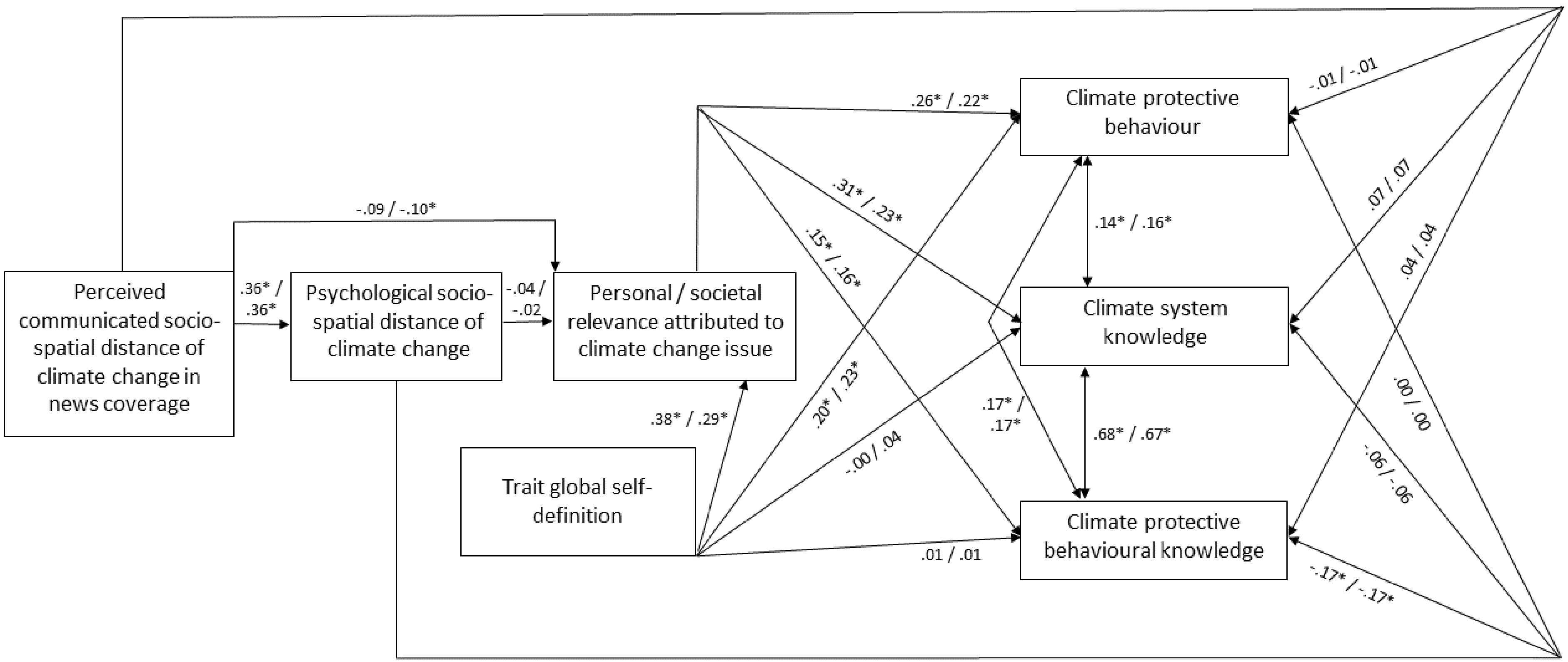


Figure 13. Unmoderated path models in Study 1 including the self-investment dimension of global identity and personal/societal relevance, respectively.

Note. Standardised coefficients are displayed. Relations between climate protective behaviour, climate system knowledge, and climate protective behavioural knowledge represent residual covariances. * $p < .05$.

Models including global self-investment as predictor and moderator. In order to test H1.8, I included the interaction between psychological socio-spatial distance and global self-investment in the models. This changes the interpretation of the relations between psychological socio-spatial distance and relevance attribution as well as between global self-investment and relevance attribution to conditional relations (i.e., relation between psychological socio-spatial distance and relevance attribution at an average level of global self-investment and vice versa; see Figure 14). The first model including the measure of personal relevance fit the data well, $\chi^2(5) = 10.38$, $p = .065$; CFI = 99; TLI = .95 (robust TLI = 94); RMSEA = .047, 90% CI [.007, .082] (robust RMSEA = .054, 90% CI [.007, .082]); SRMR = .024. It explained 13.0% of the variance in psychological socio-spatial distance of climate change, 20.8% of the variance in personal relevance attributed to the climate change issue, 17.8% of the variance in climate protective behaviour, 10.0% of the variance in climate system knowledge, and 5.2% of the variance in climate protective behavioural knowledge.

The second model including the measure of societal relevance also fit the data well, $\chi^2(5) = 10.49$, $p = .062$; CFI = .99 TLI = .94; RMSEA = .048, 90% CI [.008, .082] (robust RMSEA = .055, 90% CI [.008, .201]); SRMR = .024. It explained 13.0% of the variance in psychological socio-spatial distance of climate change, 14.1% of the variance in societal relevance attributed to the climate change issue, 16.9% of the variance in climate protective behaviour, 6.9% of the variance in climate system knowledge, and 5.7% of the variance in climate protective behavioural knowledge. Figure 14 shows the standardised results for both models, which differed slightly in the size of the coefficients but not in the general pattern of the results.

In H1.8, I hypothesised that the relation between the psychological socio-spatial distance of climate change and the relevance attributed to the climate change issue is moderated by individuals' global self-investment. The stronger people's global self-investment, the smaller the relation should be. This assumption was not confirmed, as there was no interaction between psychological socio-spatial distance of climate change and global self-investment in predicting the personal or societal relevance attributed to the climate change issue (ps $\geq .382$).

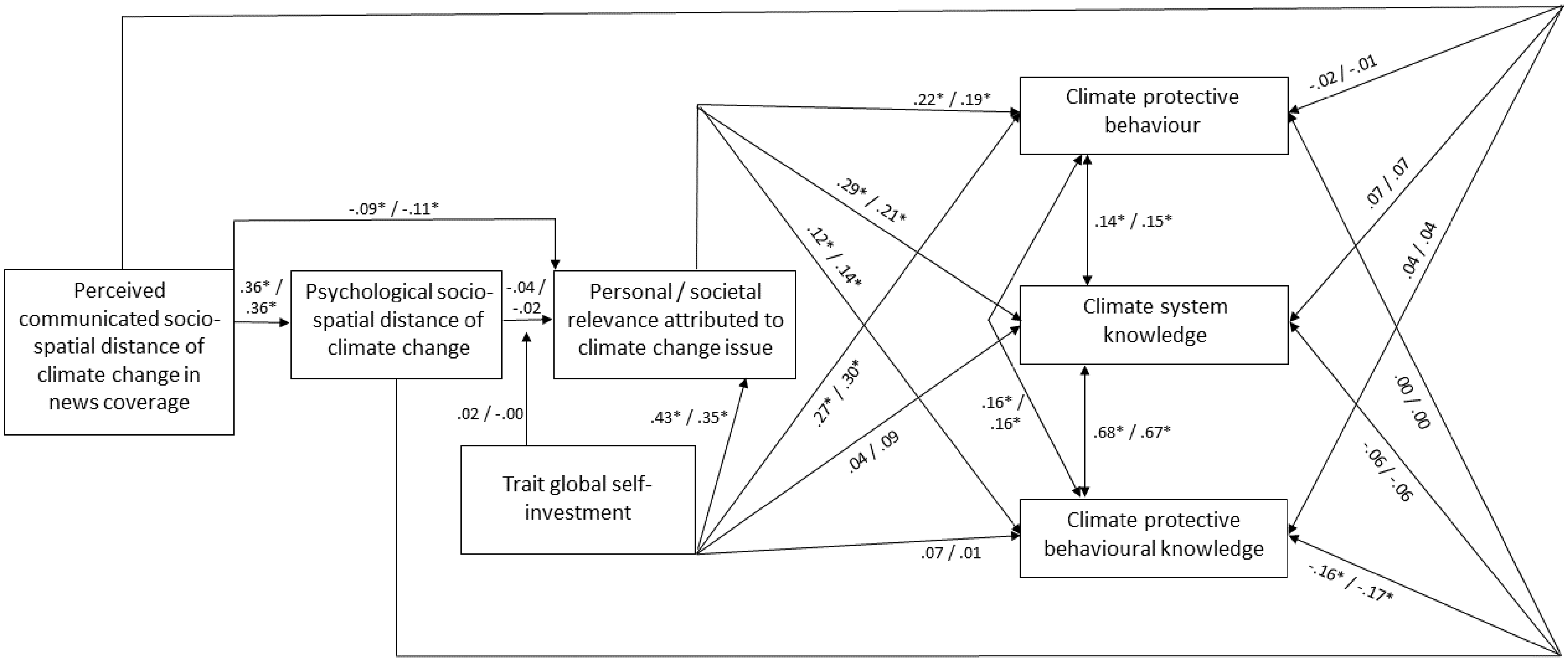


Figure 14. Moderated path models in Study 1 including the self-investment dimension of global identity and personal/societal relevance, respectively.

Note. Standardised coefficients are displayed. Relations between climate protective behaviour, climate system knowledge, and climate protective behavioural knowledge represent residual covariances. * $p < .05$.

4.3.2 Additional research question and analyses

4.3.2.1 Global identity and psychological socio-spatial distance

In further path analyses, I examined whether global identity interacts with perceived communicated socio-spatial distance of climate change in news coverage in predicting psychological socio-spatial distance in order to see whether there is a moderation effect one step earlier in the model.

First, I examined the interaction between perceived communicated socio-spatial distance in news coverage and global self-definition in predicting psychological socio-spatial distance in the model including personal relevance. The model fit the data well, $\chi^2(4) = 11.66$, $p = .020$; CFI = .99; TLI = .91 (robust TLI = .92); RMSEA = .063, 90% CI [.023, .106] (robust RMSEA = .064, 90% CI [.023, .108]); SRMR = .022. There was neither a conditional relation (i.e., at an average perceived communicated socio-spatial distance) between global self-definition and psychological socio-spatial distance of climate change ($p = .384$, $\beta = -.04$) nor an interaction between global self-definition and perceived communicated socio-spatial distance of climate change in news coverage in predicting psychological socio-spatial distance ($p = .901$, $\beta = .01$).

Afterwards, I conducted four additional analyses in a stepwise procedure. I first repeated the analysis for the model including societal relevance instead of personal relevance. Next, I repeated these two analyses including global self-investment instead of global self-definition. None of these analyses revealed any interactions between global self-definition or self-investment and perceived communicated socio-spatial distance of climate change in news coverage in predicting psychological socio-spatial distance of climate change.

4.3.2.2 Contact with the climate change issue in communication

Contact with climate change communication in the quota sample of the German population (summed percentage who came into contact at least once a month) was mostly through the Internet (46%) and public TV (46%), followed by regional newspapers (36%), radio (34%), private TV (32%), and supra-regional newspapers (29%). On the Internet, participants reported the most contact through online newspapers (23%) and social media (23%).

In RQ1.2, I asked, whether contact with the climate change issue in communication is related to a) recipients' psychological socio-spatial distance of climate change, b) the relevance attributed to the climate change issue, c) climate protective behaviour, and d) climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge. Table 7 provides an overview of bivariate relations.[10] Table 8 shows the results of multiple regression analyses including all communication channels, which I interpreted in order to answer this research question.

Psychological socio-spatial distance of climate change was not predicted by contact with the climate change issue through any of the assessed channels, apart from a small positive relation between psychological socio-spatial distance and the frequency of contact with the topic of climate change in talks or events (RQ1.2a). Personal relevance attributed to the climate change issue was positively predicted by contact with the issue through public TV and conversations with others, and negatively predicted by contact through video-sharing websites and talks or events. Societal relevance attributed to climate change was positively predicted by issue contact through academic journals and conversations with others, and negatively predicted by contact through video-sharing websites and talks or events. Relations were small to medium sized (RQ1.2b). Climate protective behaviour was positively predicted by issue contact through conversations with others, and negatively predicted by contact through talks or events. Relations were small to medium sized (RQ1.2c). Climate system knowledge was positively predicted by issue contact through public TV, brochures, and the Internet in general, and negatively predicted by contact through social media and talks or events. Knowledge about climate-relevant behaviours was positively predicted by issue contact through brochures, the Internet in general, and online newspapers in particular, and negatively predicted by contact through talks or events. Relations were small to medium sized (RQ1.2d).

Summing up contact with the issue through all assessed media channels, I found small to medium positive correlations between media contact and personal and societal issue relevance, climate protective behaviour, climate system knowledge, and climate protective behavioural knowledge (see Table 7).

[10] The more correlations assessed, the more likely one is to find significant correlations by chance. Hence, small correlations need to be interpreted with particular caution.

Table 7. Relation between contact with the climate change issue in communication and the main variables of Study 1 (Spearman's rho)

	Psychological socio-spatial distance of climate change	*Personal relevance attributed to the climate change issue*	*Societal relevance attributed to the climate change issue*	*Climate protective behaviour*	*Climate system knowledge*	*Climate protective behavioural knowledge*
1. Private TV	.03	.24*	.18*	.07	.10*	-.01
2. Public TV	.01	.32*	.26*	.21*	.23*	.13*
3. Radio	.05	.19*	.21*	.15*	.19*	.07
4. Regional newspapers	.05	.27*	.24*	.23*	.13*	.07
5. Supra-regional newspapers	.06	.25*	.18*	.22*	.16*	.06
6. Weekly newspapers	.08	.19*	.14*	.20*	.12*	.03
7. Brochures	.06	.25*	.13*	.16*	.19*	.09*
8. Academic journals	.09	.27*	.20*	.16*	.15*	.07
9. Internet	.05	.26*	.17*	.23*	.23*	.13*
9a. Online newspapers	.03	.23*	.09*	.20*	.21*	.13*
9b. Social media	.07	.11*	-.01	.02	-.10*	-.08
9c. Video-sharing websites	.05	.08	-.06	.09*	-.03	-.03
9d. Discussion platforms	.03	.17*	.04	.14*	.04	.01
10. Talks or events	.11*	.15*	.03	.06	.10*	-.02
11. Conversations with others	.02	.40*	.25*	.35*	.20*	.10*
Media contact (sum 1-9)	.04	.33*	.25*	.22*	.22*	.10*

Note. * $p < .05$

Table 8. Multiple regression analyses for contact with the climate change issue in communication and the main variables of Study 1

	Psychological socio-spatial distance of climate change	*Personal relevance attributed to the climate change issue*	*Societal relevance attributed to the climate change issue*	*Climate protective behaviour*	*Climate system knowledge*	*Climate protective behavioural knowledge*
1. Private TV	.02	.05	.09	-.10	-.02	-.13
2. Public TV	-.04	.16*	.05	.06	.16*	.13
3. Radio	.00	-.08	.10	-.09	.04	-.04
4. Regional newspapers	-.02	.01	.07	.06	-.10	.03
5. Supra-regional newspapers	.00	.00	-.07	.01	.06	.01
6. Weekly newspapers	.07	-.06	-.02	.01	-.10	-.16
7. Brochures	-.13	.07	-.06	-.04	.19*	.16*
8. Academic journals	.10	.13	.29*	.09	.01	.09
9. Internet	.00	.02	-.01	.09	.21*	.19*
9a. Online newspapers	-.06	.05	-.02	.05	.11	.11*
9b. Social media	.01	.00	-.06	-.08	-.13*	-.11
9c. Video-sharing websites	.08	-.15*	-.21*	.04	-.03	-.02
9d. Discussion platforms	-.12	.12	.10	.02	-.02	-.04
10. Talks or events	.19*	-.21*	-.21*	-.21*	-.22*	-.26*
11. Conversations with others	-.03	.31*	.19*	.35*	.07	.07
R^2	.04	.19	.15	.16	.15	.12

Note. Standardised coefficients are displayed. * $p < .05$

4.4 Discussion

In this section, I will discuss Study 1 with regard to its main results and limitations. I will outline differences to Study 2 and Study 3. Moreover, I will describe implications for Study 3, whose design and measures were informed by these results. A discussion integrating all three studies will follow in Chapter 7.

4.4.1 Summary of results

4.4.1.1 Main research questions and hypotheses

In this study, I examined how communicated socio-spatial distance of climate change in news coverage might predict public engagement in a stepwise manner. First, I examined the hypothesis that perceived communicated socio-spatial distance of climate change in news coverage positively predicts recipients' *psychological socio-spatial distance of climate change*. Indeed, the more participants perceived that news coverage communicated climate change as affecting mainly other people in distant locations, the more they themselves evaluated climate change as a phenomenon affecting mainly other people in distant locations (H1.1).

Second, I examined the hypothesis that the perceived communicated socio-spatial distance of climate change in news coverage negatively predicts the *relevance attributed to the climate change issue* indirectly through higher psychological socio-spatial distance of climate change. This assumption was not confirmed (H1.2). However, the total negative relation between perceived communicated socio-spatial distance and relevance attributed to the climate change issue (personal as well as societal relevance), including both the direct and indirect paths, was significant.

Third, I examined the hypothesis that perceived communicated socio-spatial distance of climate change in news coverage negatively predicts *climate protective behaviour* indirectly through higher psychological socio-spatial distance of climate change and lower relevance attributed to the climate change issue (serial indirect relation). This assumption was not confirmed (H1.3). Moreover, there was also no total relation between perceived communicated socio-spatial distance and climate protective behaviour, including both the direct and indirect paths.

Fourth, I examined the hypothesis that perceived communicated socio-spatial distance of climate change in news coverage negatively predicts *climate change knowledge* in the form of climate system knowledge and climate protective behavioural knowledge indirectly through a higher psychological socio-spatial distance of climate change and a lower relevance attributed to the climate change issue (serial indirect relation). This assumption was not confirmed (H1.4). Moreover, there were also no total relations between perceived communicated socio-spatial distance and either climate system knowledge or climate protective behavioural knowledge, including direct and indirect paths. However, I found a direct negative relation between the psychological socio-spatial distance of climate change and climate protective behavioural knowledge and a small indirect negative relation of perceived communicated socio-spatial distance with climate protective behavioural knowledge through psychological socio-spatial distance.

Even though the correlational design of the study does not allow for causal inferences on effects of communicating proximity versus distance in climate change communication, the relations can give respective hints that need to be confirmed with experimental research in a second step. Summarising the results, communicating proximity in news by focussing on locally expected consequences for the addressed audience might be a way to decrease people's psychological socio-spatial distance of climate change and increase the personal and societal relevance attributed to the issue (even though the process might not be through a reduced psychological socio-spatial distance). Moreover, it might be a way to increase the acquisition of climate protective behavioural knowledge through reducing the psychological socio-spatial distance of climate change. However, communicating proximity might not be a way to motivate climate protective behaviour and climate system knowledge.

Fifth, I examined the hypothesis that climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge is positively related to climate protective behaviour. Indeed, the more climate protective behaviour participants engaged in, the greater their system knowledge and behavioural knowledge (H1.5). The size of the relation between climate protective behaviour and system knowledge did not differ from the size of the relation with behavioural knowledge (RQ1.1).

The correlational design of this study does not allow for causal inferences about the direction of effects. On the one hand, knowledge might be a precondition for climate protective behaviour. However, behavioural knowledge does not seem to be more important. On the other hand, behaving in a climate friendly way could precede further knowledge acquisition attempts, or the two might mutually affect one another.

Sixth, I examined the predicting and moderating role of people's global identity as a trait, differentiating between the dimensions of global self-definition and global self-investment. Confirming my hypothesis, the stronger people identified themselves with people all over the world (i.e., global self-definition) and felt concern for these people's well-being (i.e., global self-investment), the more personally and societally relevant they evaluated the global issue climate change (H1.6a) and the more climate friendly behaviour they engaged in (H1.6b). Moreover, partly confirming my expectation, global self-definition and global self-investment positively predicted climate system knowledge with respect to the total relation. A closer look at the direct paths and the indirect paths through personal and societal relevance attributed to the issue showed that only the indirect paths were significant. Only global self-investment, and not global self-definition, predicted climate protective behavioural knowledge with respect to the total relation. A closer look at the direct paths and the indirect paths through personal and societal relevance attributed to the issue showed that only the indirect paths were significant (H1.6c). This seems striking at first sight. However, O'Rourke and MacKinnon (2015) showed that mediator models can be more powerful than tests of direct relations in large samples with small coefficients, because the standard error of the total relation can be larger than the standard error of the indirect relation. In order not to exploit this circumstance and to avoid erroneous theoretical conclusions, they argue that "there must be theoretical support for the inclusion of a mediator in the planning stages of the study. The inclusion of mediators must be theory-driven, not data-driven" (p. 438). As I did not explicitly formulate an a priori hypothesis on the indirect relation between global identity and the dependent variables through relevance, the results must be treated with caution, even though they make theoretical sense.

Contrary to my expectation, neither global self-definition nor self-investment interacted with participants' psychological socio-spatial distance of climate change in predicting personal or societal relevance attribution (i.e., the relevance attributed to climate change was negatively related to people's psychological socio-spatial distance regardless of the strength of their identification with people all over the world and concern for these people's well-being; H1.8). Hence, psychological socio-spatial distance does not seem to be bridged by people with a strong global identity.

Just as for all other results, no causal impact mechanism can be clearly inferred from the correlational evidence presented. On the one hand, fostering a greater global identity might lead a person to consider climate change as more relevant, behave in a more climate friendly way, and acquire more climate-related knowledge. On the other hand, increasing the relevance of climate change and promoting climate protective knowledge and actions might foster identification with all humanity, or both might be caused by unconsidered third variables, such as pro-social norms acquired through education.

The results of Study 1 outlined here will be further discussed in combination with the results of Study 2 and Study 3 in Chapter 7.1.

4.4.1.2 Additional research question

In an additional research question, I examined the association between the climate change-related outcomes and participants' prior contact with the climate change issue in communication through diverse channels, including several offline and online media outlets (i.e., private TV, public TV, radio, regional, supra-regional, and weekly newspapers, brochures, academic journals, the Internet in general, and online newspapers, social media, video-sharing websites, online discussion platforms in particular), talks or events, and personal conversations.

Psychological socio-spatial distance of climate change was not related to contact with the climate change issue in communication through any of the assessed channels apart from a small positive correlation with the frequency of contact through talks or events (RQ1.6a). However, 63% of the sample attended such talks or events never or once a year at most. On the one hand, this might imply that while most past climate change communication did not contribute to or promote participants' perception of climate change as a socio-spatially distant phenomenon, talks or events about climate change might invoke psychological socio-spatial distance of the issue. On the other hand, an alternative interpretation could be that psychological socio-spatial distance does not prevent people from taking in information about the topic, with people who perceive of the issue as distant potentially even informing themselves more via talks or events.

The more contact with climate change information participants had through public TV and conversations with others, the more they considered the topic of climate change to be personally relevant. Contact with the issue via video-sharing websites and talks or events negatively predicted the personal relevance attributed to the topic. The societal relevance attributed to climate change was positively predicted by contact with the issue through academic journals and conversations with others, and negatively predicted by contact through video-sharing websites and talks or events. The relations were small to medium sized (RQ1.6b). On the one hand, climate change communication through public TV or academic journals might convey the relevance of climate change. However, the majority of the sample rarely came into contact with the issue through academic journals. Moreover, talking about the issue with others might increase issue relevance. On the other hand, considering the topic of climate change relevant might be a precondition for taking in information via public TV, academic journals, or in personal conversations. Video-sharing platforms and talks or events might even tend to raise scepticism about the relevance of the issue or serve as a source of information for people who doubt the relevance of the issue. Summing up contact with climate change through all assessed media channels, I found a medium positive correlation with personal issue relevance and a small to medium positive correlation with societal issue relevance. On the one hand, this correlation could indicate that contact with the issue through diverse channels fosters issue relevance. On the other hand, people who find the issue relevant might be more attentive to climate change communication in the media.

Contact with climate change information through the assessed media channels did not predict climate protective behaviour. These results are in line with Taddicken's (2013) study of German Internet users, which found no relation between climate change-related TV, radio, print, and Internet use and participants' support for climate protective measures as a behavioural indicator. When summing up contact with climate change through all assessed media channels, I found a small to medium positive correlation with climate protective behaviour. On the one hand, this correlation could indicate that contact with the issue through diverse channels motivates climate protection. On the other hand, people who behave in a climate protective manner might be more attentive to climate change communication in the media. Moreover, climate protective behaviour was positively associated with personal conversations about the issue, while contact with the issue in talks or events was again a negative predictor. Relations were small to medium sized (RQ1.6c). On the one hand, personal conversations might motivate climate protective actions, while talks and events demotivate them. On the other hand, people who behave in a climate friendly way might be more open to discuss the issue in personal conversations with others and less interested in seeking information through talks or events.

Finally, the more contact with climate change information participants had through public TV, brochures, and the Internet in general, the greater their knowledge about the climate system. Contact through social media and talks or events was negatively related to climate system knowledge. Knowledge about climate-relevant behaviours was positively predicted by participants' contact with climate change information in brochures, the Internet in general, and online newspapers in particular. It was negatively predicted by contact through talks or events. Relations were small to medium (RQ1.6d). On the one hand, existing climate change communication in public TV might tend to convey climate system knowledge rather than climate protective behavioural knowledge. Hence, policymakers may wish to reflect upon whether the existing content could be extended. Brochures and the Internet may convey both types of knowledge. Communication in social media might involve content that is not in line with the knowledge communicated by the IPCC and therefore even decrease users' knowledge. For example, Williams, McMurray, Kurz, and Lambert (2015) found that communication about climate change in social media often takes place in so-called echo chambers of like-minded people who are either sceptics or activists. On the other hand, people who are already knowledgeable about climate change might be more open to climate change-related information on public TV, brochures, and the Internet and less open to information in social media. The results are similar to Taddicken's (2013) study of German Internet users, which found that climate change-related TV use but not radio and print use predicted climate change knowledge. However, in contrast to my study, she found no relation with Internet use. When summing up contact with climate change through all assessed media channels, I found a small to medium positive correlation with climate system knowledge and a small positive correlation with climate protective behavioural knowledge. On the one hand, this correlation could indicate that contact with the issue through diverse channels fosters knowledge. On the other hand, knowledgeable people might be more attentive to climate change communication in the media.

4.4.2 Limitations and implications for developing Study 3

In this section, I describe some key limitations of Study 1, which were considered when designing Study 3. A further discussion of the limitations and implications of all three studies combined will follow in Chapter 7.

The most important limitation of Study 1 is its fully correlational design and thus the impossibility of inferring causal impact mechanisms, as all relations could be unidirectional, bidirectional, or caused by unconsidered third variables. By designing experiments in Studies 2 and 3, I sought to examine the impact of the communicated socio-spatial proximity vs. distance of climate change in a news text on psychological socio-spatial distance of climate change, climate change knowledge communicated in the news text, and climate protective behaviour with a design that allowed for causal inferences.

The measure of psychological distance did not result in optimal factor loadings for the dimensions of temporal and hypothetical distance. The measure was improved in Study 3 on the basis of the CFA as well as comments in the open answer section (see Chapter 6.2.4.1).

The results for the models including personal vs. societal relevance differed slightly in the size of the coefficients but not in the general pattern of relations. In order to reduce complexity and questionnaire length, this differentiation was not made in Studies 2 (see Chapter 5.2.4.2) and 3 (see Chapter 6.2.4.2).

A further important limitation of Study 1 refers to the programming mistake I made regarding the climate change knowledge measure, which forced me to exclude the items on behavioural effectiveness knowledge (see Chapter 4.2.3.4). Respective items were included in Study 2 (see Chapter 5.2.4.3) and Study 3 (see Chapter 6.2.4.3).

The Rasch model for the climate protective behaviour measure did not fit the data of 6.8% of participants well, which slightly exceeds the recommended threshold of 5%. I did not adapt and include the measure in Studies 2 and 3, as I aimed to observe behavioural indicators in an experimental setting. However, in future similar studies, the scale could be expanded to include more items in order to better suit a variety of respondents. The GEB scale often includes up to 50 or even 65 actions. Nevertheless, questionnaire length and the corresponding burden for participants has to be weighed against such an expansion and will depend on the number of constructs assessed in a study.

5. Study 2: Laboratory experiment

This study was conducted between May 23 and June 8, 2016 in the laboratory of the Department of Media Psychology at the University of Hohenheim. Expenses for the incentives were covered with my personal means. Sophie Kitzmann supported the study as a student assistant.

5.1 Background

5.1.1 Specific aims of the study

This study was designed with the following aims:

- By conducting an experiment, I sought to examine the impact of communicated socio-spatial proximity vs. distance of climate change in a news text on recipients' psychological socio-spatial distance of climate change, the relevance attributed to the news text on climate change, climate protective behaviour, and climate change knowledge with a design allowing for *causal inferences*.
- By conducting the experiment in the laboratory, I aimed to *focus on internal validity* (i.e., to maximally standardise and control the setting). I thus accepted compromising on external validity (i.e., studying news reception in individuals' natural environment).
- As in Study 1, I included a trait measure of global identity in order to examine its relation with the dependent variables as well as its potential moderating role.

5.1.2 Main research questions and hypotheses

The research questions and hypotheses parallel Study 1 in their structure. However, the independent variable is now communication of socio-spatial proximity vs. distance in a provided news text on climate change. Relevance attribution refers to the provided news text, knowledge refers to information provided in the news text, and the indicators of climate protective behaviour were immediately assessed after reception of this news text. Global identity salience, which is addressed by the general hypotheses H7 and H9, was not investigated here, only in Study 3.

H2.1: Communication of socio-spatial proximity vs. distance of climate change in a news text reduces recipients' *psychological socio-spatial distance* of climate change.

H2.2: Communication of socio-spatial proximity vs. distance of climate change in a news text positively predicts the *relevance attributed to the news text about the climate change issue* indirectly through lower psychological socio-spatial distance of climate change.

H2.3: Communication of socio-spatial proximity vs. distance of climate change in a news text positively predicts *climate protective behaviour* indirectly through lower psychological socio-spatial distance of climate change and higher relevance attributed to the news text about the climate change issue (serial indirect relation).

H2.4: Communication of socio-spatial proximity vs. distance of climate change in a news text positively predicts *climate change knowledge* in the form of climate system knowledge and climate protective behavioural knowledge indirectly through lower psychological socio-spatial distance of climate change and higher relevance attributed to the news text about the climate change issue (serial indirect relation).

H2.5: Climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge is positively related to climate protective behaviour.

RQ2.1: Is the relation with climate protective behaviour different for climate system knowledge compared to climate protective behavioural knowledge?

H2.6: Individuals' *global identity as a trait* (i.e., the dimensions *global self-definition* and *global self-investment*) positively predict a) the relevance attributed to a news text about the climate change issue, b) climate protective behaviour, and c) climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge.

H2.8: The relation between the psychological socio-spatial distance of climate change and the relevance attributed to a news text about the climate change issue is moderated by individuals' global identity (i.e., the dimensions of global self-definition and global self-investment). The more people identify with people all over the world (global self-definition) and the more they care about their well-being (global self-investment), the smaller the relation (i.e., people who only weakly identify with and care little about people all over the world will evaluate news about the climate change issue as more relevant when their psychological socio-spatial distance is lower, while it will not make a difference or at least a smaller difference for people who strongly identify with and care a lot about people all over the world).

By including a control group receiving no stimulus, I additionally aimed to estimate the effect of exposure to a news text on climate change on the outcomes.

5.2 Method

5.2.1 Participants

Using the program G*Power 3 (Faul, Erdfelder, Lang, & Buchner, 2007), I conducted an a priori power analysis for the experimental design I used, considering the number of independent and dependent variables. I determined the sample size necessary to find effects of medium size (f^2 = .15) at p < .05 with 90% power for a design with a one-factorial independent variable with three groups (i.e., proximity, distance, and control condition) and seven assessed dependent variables (i.e., psychological socio-spatial distance, relevance attributed to the news text, three indicators of climate protective behaviour, climate system knowledge, and climate protective behavioural knowledge) in a multivariate analysis of variance. The resulting necessary sample size was 84. In addition, I calculated the sample size necessary to find bivariate correlations of medium size (r = .30) at p < .05 with 90% power. It turned out to be 92. I extended this minimum to 99 to allow for drop-out or invalid datasets. However, no drop-out or invalid datasets occurred.

The self-selected convenience sample consisted of N = 99 students (n = 58 females, M = 21 years of age, SD = 2.4). For recruitment, I contacted several professors at the University of Hohenheim. These professors gave the student assistant permission to announce the study in several lectures and hand out lists with possible time slots. The students who signed up provided their email addresses, and we reminded them of the time and location on the day before their respective laboratory sessions. We avoided recruiting students of communication as some of them might have heard about the study's research aims in prior classes and might thus provide biased answers. The fields of study represented were Agriculture (n = 46), Economics (n = 37), Nutrition (n = 10), Management (n = 3), and Mechanical Engineering (n = 2). German was the native language of n = 94 participants, n = 92 considered Germany their home, and n = 81 planned to live in Germany in the future. Participants received €5 compensation. They could donate as much of the €5 as they liked to a climate-related organisation as one of the dependent variables assessed in the study (see Chapter 5.2.4.4).

5.2.2 Design and procedure

Laboratory sessions were led by the student assistant. She was blind regarding the design and hypotheses of the study and received a written and oral briefing on how to conduct the sessions. Participants were welcomed into the laboratory and seated at individual desks with computers which were separated by movable walls as visual covers. Each participant received a closed envelope with a code. The envelope contained €5 in coins (this was the compensation for participating in the study, and they could donate as much as they liked to a climate-related organisation as one of the dependent variables assessed in the study, see Chapter 5.2.4.4). Up to 11 people participated simultaneously. The student assistant explained the content and duration of the study, the voluntary nature of participation and the possibility of withdrawing at any time, as well as data security standards. This information was also displayed at the computer screens and participants were encouraged to read it before agreeing to participate in the study. Again, the questionnaire was programmed with the software package SoSci Survey. The experiment was initially presented as a study on information processing of media content.

Participants first had to type in the code displayed on their envelope. They were then randomly assigned to one of three message conditions by the software (n = 33 to the proximity condition, n = 33 to the distance condition, n = 33 to the control condition). In the first experimental condition, participants received an online news text on climate change and its consequences that specifically referred to Germany (proximity). In the second experimental condition, they received an online news text on climate change and its consequences that referred to global impacts, mainly in developing countries (distance). In both experimental groups, participants answered questions after the stimulus presentation in the outlined order on the psychological distance of climate change; the relevance they attributed to the news text; climate change knowledge covered in the news text; climate protective behaviour indicators; social identity, including global identity; the perceived communicated distance of climate change in the news text as a manipulation check for the text variation; and their climate change-related media experience, demographic characteristics, and relation to Germany as control questions.

In the control condition, participants did not receive a news text at the beginning. They first answered the questions on psychological distance of climate change, climate change knowledge (presented as the contents of the IPCC report), indicators of climate protective engagement, and social identity, including global identity. However, to keep participation duration in the laboratory as constant as possible, they then received the news text (distance version). Subsequently, they answered the questions on the perceived communicated distance of climate change in the news text, the relevance they attributed to the news text, their climate change-related media experience, demographic characteristics, and their relation to Germany.

All questionnaire versions ended with an awareness check, space for comments, and a debriefing. Participants were instructed to open the envelope, take the amount they would like to keep, and leave the envelope with the amount they would like to donate at their desk (see also Chapter 5.2.4.4).

5.2.3 Stimulus material

Because I aimed to investigate news reception and its effects as authentically as possible, I asked participants to read the online news text without any further instructions. Other studies on the effects of climate change communication sometimes instruct participants to pay close attention to the stimulus and give them hints that questions on the content will later be asked (e.g., Spence & Pidgeon, 2010). However, I argue that receiving a news text with these instructions compromises the external validity with respect to news reception. For my research questions, it is not necessary to ask participants to pay close attention. Rather, I aimed to study their news reception with as little experimental influence as possible and in terms of the attention they devote on their own terms.

The online news text (see Appendix 3) outlined scientific knowledge on climate change and its consequences (see Schoenefeld & McCauley, 2016; Spence & Pidgeon, 2010) as well as suggested solutions (see Scannell & Gifford, 2013). Implementing the communication strategy of proximising climate change by focussing on local consequences (van der Linden et al., 2015), communication of the socio-spatial proximity vs. distance of climate change in the news text was varied. The news text either communicated consequences affecting Germany (*communication of socio-spatial proximity*) or argued that climate change is an issue with global impacts, mainly in developing countries (*communication of socio-spatial distance*; see Brügger et al., 2016; Scannell & Gifford, 2013). The specific contents and wording were kept constant (i.e., consequences were selected that are expected in Germany as well as other parts of the world, such as heat waves). The stimulus text was based on an online news article from the Süddeutsche Zeitung.[11] I imitated its layout without referring to the newspaper itself (see Hart & Nisbet, 2012). The article communicated insights from the IPCC report (2014). I checked the correctness of the outlined contents and consulted a book on the expected consequences of climate change in Germany (Gerstengarbe & Welzer, 2013) as well as online sources on climate protective behavioural options.[12]

I adapted the text to include knowledge contents similar to the climate change knowledge measure by Tobler et al. (2012) and Shi et al. (2015), extended to include content from the measure by Frick et al. (2004) as well. The news article was titled "What scientists know about climate change and its consequences in Germany/ its global consequences". It covered *climate system knowledge* in the form of physical knowledge on CO_2 and the greenhouse effect as well as climate change and its causes (i.e., sections titled "How much has the temperature risen and why?", "How hot could it get?", "What are the consequences of climate change for the planet?"), and the consequences of climate change (i.e., sections titled "What are the consequences of climate change for people/for people in Germany?", "What is the relation between climate change and resources?", "Does climate change affect conflicts?"). Moreover, it covered *climate protective behavioural knowledge* regarding climate-relevant actions and their effectiveness (i.e., section titled "How can we react to climate change?"). The proximity text included 1041 words and a picture showing flooding of the German Elbe river. The distance text included 1035 words and a picture showing flooding in Thailand. Both pictures displayed characteristic houses for the respective region surrounded by high water (for a similar approach, see Spence & Pidgeon, 2010).

5.2.4 Measures

In this section, I describe the scales used in the survey with example items translated into English. The German items can be found in Appendix 2. Table 9 provides an overview of the main scale characteristics.

[11] http://www.sueddeutsche.de/wissen/erderwaermung-was-forscher-ueber-den-klimawandel-wirklich-wissen-1.2757138
[12] https://www.umweltbundesamt.de/themen/verkehr-laerm/emissionsdaten; VCD (2014); Schächtele and Hertle (2007)

Table 9. Psychometric properties of the measures used in Study 2

Variable	*n*	*M*	*SD*	range	items	α	ω	AVE	R_P
Psychological distance of climate change (4-dim)	99	3.48	0.91	1.43–5.36	14	.82	.89	.56	-
Psychological socio-spatial distance of climate change [a]	99	3.50	1.40	1.00–6.67	6	.90	.94	.74	
Relevance attributed to news text on climate change	99	5.84	0.92	2.40–7.00	5	.84	.84	.52	-
Climate system knowledge [b]	99	-0.75	0.87	-2.92–1.04	28	.69	-	-	.69
Climate protective behavioural knowledge [b]	99	-0.34	1.70	-3.34–3.60	8	.70	-	-	.72
Climate protective behaviour									
Information amount (0-4)	99	2.55	1.19	0.00–4.00	-	-	-	-	-
Information time (in sec)	99	42	28	0–128	-	-	-	-	-
Donation amount (€0-5)	99	0.67	1.13	0.00–5.00	-	-	-	-	-
Global identity									
Global self-definition dimension	99	2.35	0.68	1.00–4.25	4	.71	.71	.39	-
Global self-investment dimension	99	3.69	0.60	2.00–5.00	4	.64	.64	.31	-

Note. The mean scores, standard deviations, and ranges of the scales analysed according to classical test theory displayed are based on raw scores instead of the factor scores used in the later models. As factor scores are centred around 0, the raw scores give a better impression of how participants answered the scales with regard to the answer format used. [a] The measure was reduced from 8 to 6 items based on the scale analysis. [b] Results are based on Rasch analyses.

5.2.4.1 Psychological distance of climate change

The measure used to assess psychological distance was equivalent to Study 1 (see Chapter 4.2.3.2 for the translated items) and comprised a fully labelled Likert scale ranging from 1 (*fully disagree*) to 7 (*fully agree*) for all items: psychological social distance (M = 3.50, SD = 1.53, range = 1.00 – 6.75) and psychological spatial distance (M = 3.48, SD = 1.41, range = 1.00 – 6.00) were measured with four items each, while psychological temporal distance (M = 4.01, SD = 1.23, range = 1.00 – 6.67) and psychological hypothetical distance (M = 2.93, SD = 1.11, range = 1.00 – 7.00) were measured with three items each.

Psychological distance of climate change. Similarly to Study 1, a CFA of the 4-dimensional model with a superordinate factor representing psychological distance showed that the items for psychological temporal and hypothetical distance require improvement, $\chi^2(73) = 139.48$, $p < .001$; CFI = .88 (robust CFI = .89); TLI = .85 (robust TLI = .87); RMSEA = .096, 90% CI [.071, .120] (robust RMSEA = .097, 90% CI [.072, .121]); SRMR = .070. Cronbach's alphas were α = .90, .88, .52, and .61, omegas were ω = .90, .88, .58, and .65, and AVE = .70, .66, .37, and .41, respectively. The temporal and hypothetical dimensions did not load well on the superordinate factor (.29 and .07, respectively) and three items had factor loadings ≤ .63. All other loadings of the scale were ≥ .70. These results were used to improve the scale in Study 3.

Psychological socio-spatial distance of climate change. In my research questions and hypotheses, I focussed on the dimensions of psychological social and spatial distance as the communication strategy of proximising climate change addresses these dimensions in a confounded way. Hence, I aimed to include a variable reflecting both in my analyses (i.e., psychological socio-spatial distance). To build this variable, I first calculated a 2-dimensional model with correlating factors (psychological social and spatial distance). In contrast to Study 1, the CFA for the 2-dimensional model showed that the scale needed improvement, as it did not yield satisfactory model fit, $\chi^2(19) = 45.47$, $p = .001$; CFI = .93 (robust CFI = .94); TLI = .89 (robust TLI = .92); RMSEA = .119 [.077, .161] (robust RMSEA = .126, 90% CI [.079, .173]); SRMR = .045. Factor loadings were .72, .88, .82, and .91 for psychological social distance, and .87, .69, .84, and .82 for psychological spatial distance. Cronbach's alphas were α = .90 and .88, omegas ω = .90 and .88, and AVE = .70 and .66, respectively. I excluded one item with the lowest factor loadings from each dimension, which resulted in a model with good fit, $\chi^2(8) = 6.62$, $p = .578$; CFI = 1.00; TLI = 1.01;

RMSEA = .000, 90% CI [.000, .098]; SRMR = .019. Factor loadings were .89, .78, and .93 for psychological social distance, and .89, .82, and .81 for psychological spatial distance. The covariance between the two dimensions was .73. Cronbach's alphas were α = .90 and .88, omegas ω = .90 and .88, and AVE = .76 and .71, respectively. Hence, all psychometric properties were satisfactory. I calculated the mean of the factor scores for the dimensions of psychological social and spatial distance as the measure of *psychological socio-spatial distance of climate change* in the model for examining my research questions.[13]

5.2.4.2 Relevance attributed to the news text on climate change

Adapting the measures by Weber and Wirth (2013) and Spence and Pidgeon (2010), I asked participants to "think about the article they just read". They answered five questions on a 7-point semantic differential: "The article is… uninteresting – interesting, unimportant – important, irrelevant – relevant, meaningless – meaningful, useless – useful" (M = 5.84, SD = 0.92, range = 2.40 – 7.00; note that the measure was rather skewed). The raw mean score did not correlate with the raw mean scores for psychological social distance (r_P = -.18; p = .080) or psychological spatial distance (r_P = -.04; p = .730), indicating that relevance and these two dimensions of psychological distance can be regarded as different constructs (discriminant construct validity).[14]

The CFA of the 1-dimensional model yielded satisfactory model fit, $\chi^2(5)$ = 7.14, p = .210; CFI = .98; TLI = .97; RMSEA = .066, 90% CI [.000, .154] (robust RMSEA = .075, 90% CI [.000, .187]); SRMR = .033; Cronbach's α = .84., ω = .84, AVE = .52. Hence, all psychometric properties were satisfactory.

5.2.4.3 Climate change knowledge

The conceptualisation of the knowledge measure was inspired by Tobler et al. (2012), Shi et al. (2015), and Frick et al. (2004). The corresponding information was provided in the news text. The measure included eight multiple choice recognition questions with four answer options as well as the option "I don't know" and nine open recall questions. Multiple choice items were coded as 0 (*incorrect, don't know*) or 1 (*correct*). For the questions with an open answer format, I coded predefined correct answers (i.e., information covered in the text) as 0 (*absent*) or 1 (*present*). As some of these questions

[13] As outlined for Study 1, at least three first-order factors are required to identify second-order CFA models. For this reason, I had to use the mean score of the factor scores for the two dimensions.
[14] The factor scores for relevance and psychological socio-spatial distance did not correlate either (see Table 10).

required more than one answer in order to fully cover the given information, a corresponding number of items were generated. Answers that were correct but not part of the stimulus text were not coded. In total, the measure consisted of 17 questions resulting in 36 items (M = 14.5, SD = 5.33).

Climate system knowledge. Two open questions covered system knowledge in the form of physical knowledge on CO_2 and the greenhouse effect with three coded answers each, thus resulting in six items (e.g., "Which fossil fuels accelerate the warming of the climate?" Answers: gas, oil, coal). System knowledge on climate change and its causes was assessed with four multiple choice questions (e.g., "How much was the global temperature increase between 1880 and 2012?" Correct answer: About 0.8 degrees) and one open question with two coded answers (i.e., "Why is the sea level rising?" Answers: melting ice at the poles and glaciers, thawing permafrost), thus resulting in six items. System knowledge on the consequences of climate change was assessed with three open questions with seven, five, and four coded answers, respectively, thus resulting in sixteen items (e.g., "Which health risks are expected to increase due to climate change?" Answers: cardiovascular diseases, diseases transmitted by insects, fine dust, water pollution, food supply).

Climate protective behavioural knowledge. Behavioural knowledge in the form of action knowledge was assessed with one multiple choice question (i.e., "In which months can you buy seasonal tomatoes grown in Germany?" Correct answer: July to October) and three open questions with one, two, and one coded answers, respectively (e.g., "What is mitigation?" Answer: Measures to reduce greenhouse gas emissions to attenuate climate change), thus resulting in five items. Behavioural knowledge in the form of effectiveness knowledge was assessed with three multiple choice questions (e.g., "How much greenhouse gases are emitted during the production of meat compared to the same amount of vegetables?" Correct answer: about 30 times as much).

A 1-dimensional Rasch analysis of all items resulted in a scale with a person separation reliability of R_p = .78. Item mean square infit values were between 0.70 and 1.22 and thus all below the recommended threshold of 1.30 for samples smaller than 500 participants. The model fit the data of all participants well, as indicated by person t infit values below 1.96. A descriptive analysis of the person parameters showed that the items were slightly too difficult for this sample, as indicated by a mean value of the person parameters below zero (M_θ = -0.65, SD = 0.89, range= -2.46 – 1.32).

A separate analysis of *climate system knowledge* (28 items) resulted in a scale with a person separation reliability of R_p = .69. Item mean square infit values were between 0.74 and 1.13. The model did not fit the data of only one participant well (1.0%). A descriptive analysis of the person parameters showed that items were slightly too difficult for this sample, as indicated by a mean value of the person parameters below zero (M_Θ = -0.75, *SD* = 0.87, range -2.92 – 1.04).

A separate analysis of *climate protective behavioural knowledge* (8 items) resulted in a scale with a person separation reliability of R_p = .70. Item mean square infit values were between 0.72 and 1.15 for seven items. Item 12 had an infit of 1.32 and hence slightly above the recommended threshold of 1.30. The model fit the data of all participants well. As excluding Item 12 only minimally improved person separation reliability to R_p = .71 and the resulting model did not fit the data of two participants well, I decided not to reduce the scale. A descriptive analysis of the person parameters showed that the items were well selected for this sample, as indicated by a mean value close to zero (M_Θ = -0.34, *SD* = 1.70, range -3.34 – 3.60).

5.2.4.4 Climate protective behaviour

Information behaviour. Inspired by a laboratory study on proenvironmental behaviour, I assessed information behaviour as a first indicator of climate protective behaviour after news reception. In their experiment, Pahl and Bauer (2013) assessed the time participants spent looking at environmentally relevant brochures and the number of these brochures they took with them as indicators of proenvironmental behaviour. I included a similar measure in the online questionnaire. Therefore, I introduced four climate protection initiatives with opportunities for individual engagement and asked whether participants were interested in obtaining further information. They could answer either "yes" or "no", resulting in scores for *information amount* from 0 (*none*) to 4 (*all initiatives*; *M* = 2.55, *SD* = 1.19, range = 0.00 – 4.00). The initiatives were an ecological footprint calculator, a newsletter by the German climate alliance, a social network site dedicated to climate-friendly consumption, and a university interest group dealing with climate protection measures. If participants requested further information, they received a corresponding screenshot (see Appendix 2.4).[15] I recorded how long the participants

[15] http://uba.klimaktiv-co2-rechner.de/de_DE/page/; http://www.die-klima-allianz.de/wer-wir-sind/aktivitaten/; https://utopia.de/ueber-utopia/; https://www.uni-hohenheim.de/einrichtung/global-campus-hohenheim

viewed the screenshots (time spent on each questionnaire page is automatically documented by the SoSci Survey software) and added up the durations for the four initiatives (i.e., *information time*, M = 42 sec, SD = 28, range = 0 - 128). Moreover, I asked those viewing the information whether they could imagine using/participating in the initiatives on a fully labelled scale ranging from 1 (*no*) to 5 (*yes*). They could also indicate that they already used/participated in the initiative (footprint calculator: n = 22 had already used it; n = 57 evaluated it, M = 4.51, SD = 0.60; newsletter: nobody had already subscribed to it; n = 48 evaluated it, M = 3.21, SD = 1.25; social network site: nobody already participated in it, n = 64 evaluated it, M = 3.38, SD = 1.06; university interest group, n = 1 already participated, n = 60 evaluated it, M = 3.60, SD = 0.99). These values indicate that, overall, I provided information that was not well-known and of medium interest for the participants who viewed it, with the footprint calculator the most interesting offer.

Donation behaviour. Inspired by a study on the influence of global identity on donating to global charity (see Reese, Proch, & Finn, 2015, Study 3) I assessed donation behaviour as a second indicator for climate protective behaviour. As outlined in Chapter 5.2.2, participants received an envelope with a code containing €5 in €1 coins before starting the study. After the information behaviour measure, the organisation "atmosfair" (www.atmosfair.de) was introduced, which compensates for CO_2 emissions by expanding renewable energy projects. Participants indicated the amount of their compensation they intended to donate to atmosfair, ranging from 0 (*no donation*) to 5 (*all 5 €; M* = 0.58; SD = 1.17, range = 0 – 5). At the end of the study, they were instructed to leave the envelope with the amount they would like to donate at their desk (M = 0.67; SD = 1.30, range 0 – 5; note that the measure was very skewed). Intention and actual behaviour correlated with r_P = .61 (p < .001). Two-thirds of participants did not donate. After all participants for each session had left the laboratory, the student assistant collected the envelopes, counted the donations, and wrote down the amount and code on a list, which was later matched with the data sheet. All codes could be matched correctly. A total of €66 in donations were given to atmosfair after study completion.

5.2.4.5 Social identity, including global identity

As in Study 1, I used the German translation of the *Identification with all Humanity Scale* (McFarland et al., 2012) by Reese et al. (2015) to measure global identity. It consisted of nine items with four response levels (e.g., “How close do you feel to each of the following groups? People in my personal surroundings, Germans, Europeans, people all over the world”). The level “Europeans” was included as an extension of the original scale. Answers were provided on fully labelled 5-point Likert scales, for example, ranging from 1 (*not at all close*) to 5 (*very close*).

The items on people all over the world served as a measure of global identity. Similarly to the results reported by McFarland et al. (2012) as well as my own results in Study 1, participants in this study had an average score of around three for identification with people all over the world (M = 3.00, SD = 0.54, range = 1.67 – 4.33, α = .78). The average level of identification increased with decreasing group level: identification with Europeans (M = 3.12, SD = 0.55, range 2.00 – 4.33, α = .81), identification with Germans (M = 3.37, SD = 0.61, range 1.67 – 4.56, α = .85), and identification with people in one’s personal surroundings (M = 4.57, SD = 0.32, range 3.67 – 5.00, α = .72). Identification with people all over the world was positively related to identification with Europeans (r_P = .75, p < .001), Germans (r_P = .37, p < .001), and people in one’s personal surroundings (r_P = .26, p = .009) with decreasing strength.

Global identity as 1-dimensional. The CFA of a 1-dimensional model for the nine global identity items did not yield satisfactory model fit: $\chi^2(27)$ = 51.05, p = .003; CFI = .86 (robust CFI = .87); TLI = .82; RMSEA = .095, 90% CI [.053, .135] (robust RMSEA = .093, 90% CI [.053, .133]); SRMR = .072. Factor loadings were between .40 and .67; Cronbach’s alpha was α= .78., ω = .78, AVE = .29.

Global self-definition and global self-investment dimensions. However, following the analysis suggested by Reese et al. (2015), the CFA of the 2-dimensional model (items 1-4 for self-definition, items 6-9 for self-investment) yielded acceptable model fit, $\chi^2(18)$ = 24.76, p = .132; CFI = .95; TLI = .92; RMSEA = .062, 90% CI [.000, .115] (robust RMSEA = .061, 90% CI [.000, .113]); SRMR = .057. Factor loadings were .75, .56, .64, and .55 for self-definition, and .52, .59, .59, and .51 for self-investment. The covariance of the two dimensions was .62. Cronbach’s alphas were α = .71 and .64, omegas were ω = .72 and .64, and AVE = .39 and .31, respectively. Even though the scale was not optimal in terms of factor loadings, internal consistency and AVE, this model was included in further analyses. Participants’ global self-definition (M = 2.35, SD = 0.68, range = 1.00 – 4.25) was lower than their global self-investment (M = 3.69, SD = 0.60, range = 2.00 – 5.00).

5.2.4.6 Contact with the climate change issue in the media

In order to determine climate change-related media experience, participants indicated how often in the past they had come into contact with messages about climate change in the media on an ordinal scale with the answer options 0 (*never*; n = 1, 1%), 1 (*once in half a year or less*, n = 9, 9%), 2 (*several times in half a year*, n = 28, 28%), 3 (*once a month*, n = 25, 25%), 4 (*several times a month,* n = 31, 31%), 5 (*several times a week*, n = 5, 5%; Md = 4). I used the wording "contact with" in order to include not only active but also passive information consumption.

5.2.4.7 Manipulation check and control questions

Perceived communicated distance. In order to assess the perceived communicated distance of climate change in the news text as a manipulation check, I adapted and extended the items I had used in Study 1 as a measure for perceived communicated distance in climate change news coverage. Participants answered two questions for each distance dimension on a 7-point semantic differential: "How does the journalist portray the topic of climate change in the article? It is mainly about… the present – the future"; "present events – future events" (perceived communicated temporal distance, M = 4.38, SD = 1.21, range = 1.00 – 7.00; r_S = .41, p = .001); "close locations – far locations"; "events close by – events far away" (perceived communicated spatial distance, M = 3.67, SD = 1.26, range = 1.00 – 6.00; r_S = .67, p < .001); "people like me – other people"; "events affecting myself – events affecting others" (perceived communicated social distance, M = 3.42, SD = 1.22, range = 1.00 – 5.50; r_S = .63, p < .001); "certain facts – uncertain opinions"; "likely events – unlikely events" (perceived communicated hypothetical distance, M = 2.74, SD = 1.00, range = 1.00 – 4.50; r_S = .38, p = .002).

Control questions. I asked some control items that should not differ between the experimental news text conditions. Alongside the relevance scale regarding the news text, participants indicated whether "the article is … badly written – well written" (M = 5.30, SD = 1.39, range = 1 – 7), "unreliable – reliable" (M = 5.85, SD = 0.83, range = 4 – 7), "difficult to understand – easy to understand" (M = 6.30, SD = 0.86, range = 4 – 7). Overall, these rather high mean values indicate that the news text appears to be well constructed. Alongside the communicated distance scale, I asked whether "the journalist portrays climate change as … harmless – dangerous", "weak – strong" (i.e., communicated severity,

M = 4.68, SD = 0.75, range = 3.00 – 6.50; r_S = .76, p < .001) as well as “unimportant – important” (i.e., communicated relevance, M = 6.47, SD = 0.64, range = 4 – 7).

5.3 Results

5.3.1 Relations of study variables

Table 10 displays zero-order correlations between the study variables.

Table 10. Zero-order correlations between the variables of Study 2

Variable	1	2	3	4	5a	5b	5c	6a
1. Psychological socio-spatial distance of climate change [a]								
2. Relevance of news text [a]	-.04							
3. Climate system knowledge [b]	.03	-.06						
4. Climate protective behavioural knowledge [b]	-.07	-.05	.53*					
5. Climate protective behaviour								
5a. Information amount	-.34*	.23*	.00	-.05				
5b. Information time	-.21*	.16	.06	-.12	.75*			
5c. Donation amount	-.22*	.21*	.14	-.03	.23*	.28*		
6. Global identity								
6a. Global self-definition [a]	-.03	.21*	-.07	-.15	.24*	.17	.20*	
6b. Global self-investment [a]	-.15	.19	.05	-.10	.33*	.32*	.30*	.76*

Note. Correlations are based on the complete sample, including the control condition receiving the measures in a different order. [a] Factor scores. [b] Rasch scores. * p < .05

5.3.2 Randomisation and manipulation check

Randomisation. The three experimental groups did not differ with regard to age (F(1,97) = 0.65, p = .421), gender (χ^2(2) = 2.58, p = .275), considering Germany their home (χ^2(2) = 2.15, p = .341), and planning to live in Germany in the future (χ^2(2) = 2.66, p = .265). Hence, randomisation can be regarded as successful.

Text manipulation. I conducted a MANOVA to compare the four indicators of perceived communicated distance (social, spatial, temporal, hypothetical) in both experimental groups. As the multivariate Shapiro-Wilk tests were not significant in either group, multivariate normality can be assumed (W^* = 0.96, p = .336, in the proximity condition; W^* = 0.95, p = .056, in the distance condition). Using Pillai’s trace, there was a significant effect of condition on the outcomes, V = 0.18, F(4,61) = 3.33, p = .016. Follow-up univariate ANOVAs revealed that communicated social distance was rated as higher in the distance condition (M = 3.86, SD = 1.72) than the proximity condition (M = 2.97, SD = 1.11, F(1,64) = 10.15, p = .003, d = 0.78). Communicated spatial distance was also rated as higher in the distance condition (M = 4.18, SD = 1.04) than the proximity condition (M = 3.17, SD = 1.27, F(1,64) = 12.62, p < .001, d = 0.87). There was no difference in evaluations of the communicated temporal distance between the distance condition (M = 4.62, SD = 1.01) and the proximity condition (M = 4.14, SD = 1.36, F(1,64) = 2.71, p = .105) and no difference in evaluations of the communicated hypothetical distance between the distance condition (M = 2.80, SD = 1.06) and the proximity condition (M = 2.68, SD = 0.96, F(1,64) = 0.24, p = .628). Thus, the intended specific manipulation of communicated socio-spatial distance was perceived by participants.

I conducted a second MANOVA to analyse the control variables which should not differ between conditions (communicated severity, communicated relevance, quality of writing, reliability, comprehensibility). The multivariate Shapiro-Wilk tests were significant in both groups. Hence, multivariate normality cannot be assumed (W^* = 0.89, p < .001, in the proximity condition; W^* = 0.93, p < .001, in the distance condition). Using Pillai's trace, there was no significant effect of condition on the outcomes, V = 0.14, F(5,60) = 1.90, p = .108. Neither the robust method by Munzel and Brunner using the *mulrank*() function (F = 1.77, p = .127), nor the robust method by Choi and Marden using the *cmanova*() function (H(5) = 8.26, p = .142) resulted in significant effects of condition (Wilcox, 2005). Hence, the text manipulation did not unintentionally affect the assessed control variables.

5.3.3 Main research questions and hypotheses

I calculated two unmoderated and two moderated path models to examine all research questions and hypotheses. The models only include participants in the proximity condition and the distance condition and thus a sample of n = 66.[16] Condition was coded as 0 (*communication of socio-spatial distance in the news text*) and 1 (*communication of socio-spatial proximity in the news text*) in order to investigate the effect of proximising as a communication strategy. To reduce model complexity and idiosyncratic influences of the variables (see Chapter 0), I used factor scores from the CFAs for psychological socio-

[16] The models do not include the control condition as this is not directly addressed in the research questions regarding the effect of the proximising strategy (i.e., communicating proximity vs. distance). Moreover, in the control condition, the mediator, relevance attributed to the news text, cannot be analysed as a meaningful predictor of the behavioural and knowledge outcomes as these were assessed before receiving the news text. The control group is analysed in Chapter 5.3.4.2 in order to determine baseline levels of the dependent variables in comparison to the experimental groups.

spatial distance (centred mean of the two dimensions), relevance attributed to the news text, global self-definition, and global self-investment, as well as the Rasch-based person estimates for climate system knowledge and climate protective behavioural knowledge. First, I calculated an unmoderated and a moderated model including the self-definition dimension of global identity. Second, I calculated an unmoderated and a moderated model including the self-investment dimension of global identity.

5.3.3.1 Models including the self-definition dimension of global identity

Unmoderated model including global self-definition as predictor. In order to test H1.1 to H1.6, I calculated an unmoderated path model. The model fit the data satisfactorily in terms of χ^2, CFI and SRMR but not TLI and RMSEA[17], $\chi^2(1) = 2.16$, $p = .141$; CFI = .98 (robust CFI = .99); TLI = .49 (robust TLI = .53); RMSEA = .133 (robust RMSEA = .128; no confidence intervals could be determined); SRMR = .028. It explained 0.2% of the variance in psychological socio-spatial distance, 8.0% of the variance in relevance attributed to the news text on climate change, 19.4% of the variance in the amount of information viewed on climate protective engagement options, 10.5% of the variance in the time spent viewing this information, 10.7% of the variance in donations to the climate protection organisation, 1.7% of the variance in climate system knowledge, and 0.6% of the variance in climate protective behavioural knowledge. Figure 15 shows the standardised results.

[17] I will reflect on possible reasons for this in the discussion section.

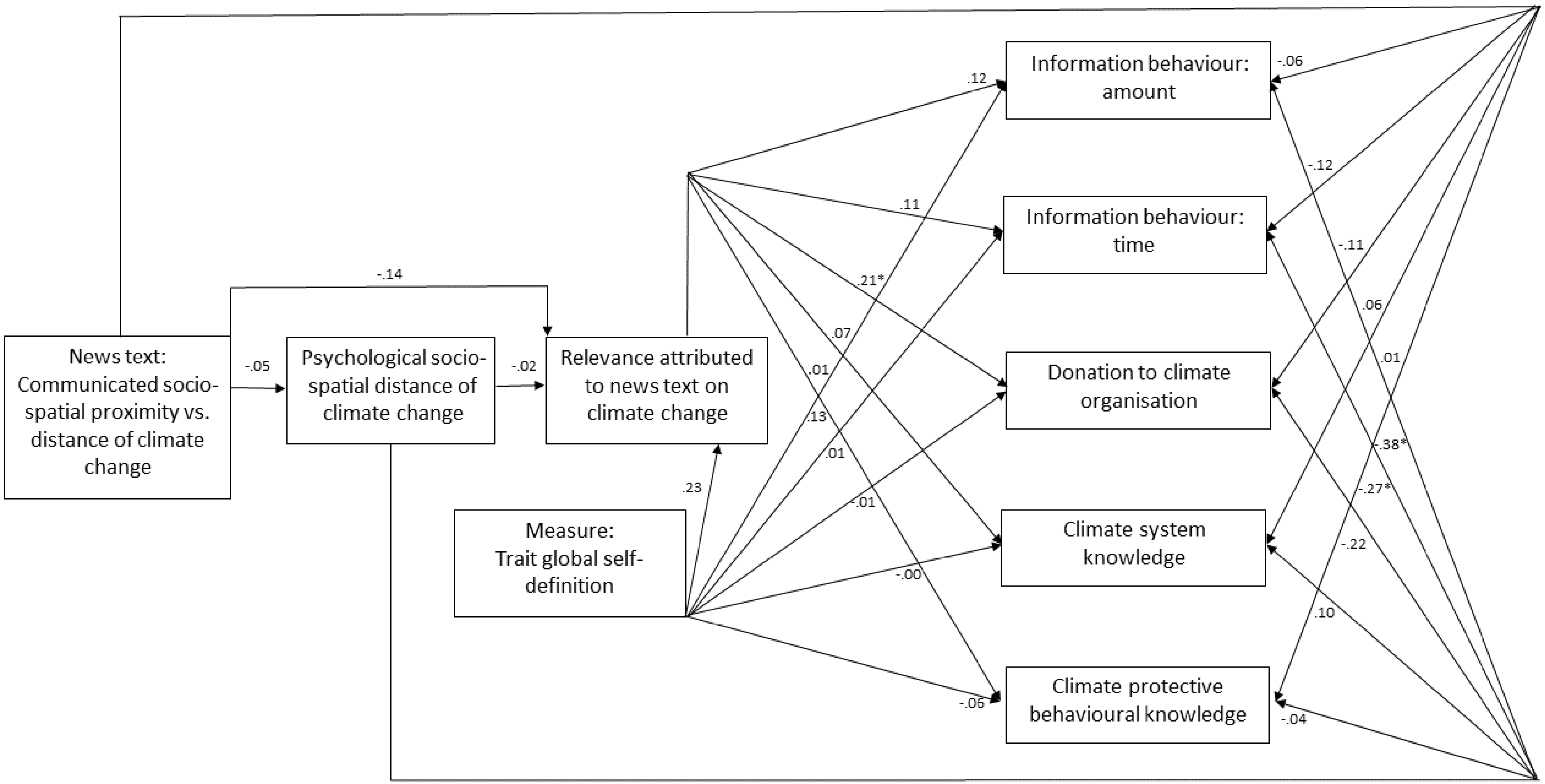


Figure 15. Unmoderated path model in Study 2 including the self-definition dimension of global identity.

Note. Standardised coefficients are displayed. * $p < .05$. Residual covariances between the behavioural and knowledge outcomes are not displayed to reduce complexity.

In H2.1, I hypothesised that communication of socio-spatial proximity vs. distance of climate change in a news text reduces recipients' *psychological socio-spatial distance of climate change*. This assumption was not confirmed, as proximising climate change did not impact psychological socio-spatial distance (p = .692, β = -.05).

In H2.2, I hypothesised that communication of socio-spatial proximity vs. distance of climate change in a news text positively predicts the *relevance attributed to the news text about the climate change issue* indirectly through lower psychological socio-spatial distance of climate change. This assumption was not confirmed, as proximising climate change did not indirectly predict relevance attributed to the news text through psychological socio-spatial distance (p = .867, β = .00). Moreover, there was also no direct impact on relevance attribution (p = .251, β = -0.14) and no total relation, including both direct and indirect paths (p = .247, β = -0.14).

In H2.3, I hypothesised that communication of socio-spatial proximity vs. distance of climate change in a news text positively predicts *climate protective behaviour* indirectly through lower psychological socio-spatial distance of climate change and higher relevance attributed to the news text about the climate change issue (serial indirect relation). This assumption was not confirmed as proximising climate change did not indirectly predict the three indicators of climate protective behaviour (i.e., amount of information viewed on climate protective engagement options, time spent viewing this information, donation to climate protection organisation, ps ≥ .865, βs = .00). Moreover, there were also no direct impacts on the three indicators of climate protective behaviour (ps ≥ .303, -.12 ≤ βs ≤ -.06) and no total relations (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; ps ≥ .312, -.12 ≤ βs ≤ -.06).

However, psychological socio-spatial distance of climate change directly and negatively predicted the amount of information viewed on climate protective engagement options (B = -0.33, SE = 0.09, 95% CI [-0.51, -0.14], p < .001, β = - .38) and the time spent viewing this information (B = -5.50, SE = 2.47, 95% CI [-10.50, -0.28], p = .026, β = - .27). Relevance attributed to the news text directly and positively predicted donations to the climate protection organisation (B = 0.32, SE = 0.14, 95% CI [0.05, 0.69], p = .021, β = .21).

In H2.4, I hypothesised that communication of socio-spatial proximity vs. distance of climate change in a news text positively predicts *climate change knowledge* in the form of climate system knowledge and climate protective behavioural knowledge indirectly through lower psychological socio-spatial distance of climate change and higher relevance attributed to the news text about the climate change issue (serial indirect relation). This assumption was not confirmed, as proximising climate change did not indirectly predict climate system knowledge and climate protective behavioural knowledge (ps ≥ .868, βs = .00). Moreover, there were also no direct impacts on either type of knowledge (ps ≥ .634, βs ≤ .06) and no total relations (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; ps ≥ .732, βs ≤ .04).

In H2.5, I hypothesised that climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge is positively related to climate protective behaviour. As the path model contains the residual covariances only, I additionally calculated bivariate correlations to test this hypothesis. However, neither climate system nor climate protective behavioural knowledge were significantly related to any of the three indicators of climate protective behaviour ($-.10 \leq r_P \leq .09$, ps ≥ .431; -.11 ≤ ψs ≤ .14, ps ≥ .250).

In RQ2.1, I asked whether the relation with climate protective behaviour is different for climate system knowledge compared to climate protective behavioural knowledge. However, as described above, no relations were found for either type of knowledge.

In H2.6, I hypothesised that individuals' *global self-definition* positively predicts a) the relevance attributed to a news text about the climate change issue, b) climate protective behaviour, and c) climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge. H2.6a was not confirmed, as there was no relation between global self-definition and relevance attribution; there was only a tendency in this direction that did not reach statistical significance (p = .096, β = .23). In order to test H2.6b and H2.6c, I examined the total relations, including both the direct paths and the indirect paths through relevance attribution. H2.6b and H2.6c were not confirmed, as there were no significant total relations between global self-definition and the three indicators of climate protective behaviour, climate system knowledge, and climate protective behavioural knowledge (ps ≥ .250, βs ≤ .16). All direct and indirect paths were not significant (ps ≥ .188).

Moderated model including global self-definition as predictor and moderator. In order to test H2.8, I included the interaction between psychological socio-spatial distance and global self-definition in the model. This changes the interpretation of the relations between psychological socio-spatial distance and relevance attribution as well as between global self-definition and relevance attribution to conditional relations (i.e., relation between psychological socio-spatial distance and relevance attribution at an average level of global self-definition and relation between global self-definition and relevance attribution at an average level of psychological socio-spatial distance; see Figure 16). The model fit the data satisfactorily in terms of χ^2 and SRMR but not CFI, TLI, and RMSEA, $\chi^2(7) = 12.04$, $p = .099$; CFI = .94; TLI = .65 (robust TLI = .66); RMSEA = .104, 90% CI [.000, .202]; SRMR = .053. It explained 0.2% of the variance in psychological socio-spatial distance, 13.2% of the variance in relevance attributed to the news text on climate change, 20.0% of the variance in the amount of information viewed on climate protective engagement options, 10.9% of the variance in the time spent viewing this information, 11.3% of the variance in donations to the climate protection organisation, 1.6% of the variance in climate system knowledge, and 0.6% of the variance in climate protective behavioural knowledge.

In H2.8, I hypothesised that the relation between the psychological socio-spatial distance of climate change and the relevance attributed to a news text about the climate change issue is moderated by individuals' global self-definition. The stronger people's global self-definition, the smaller the relation should be. This assumption was not confirmed as there was no significant interaction between psychological socio-spatial distance of climate change and global self-definition in predicting the relevance attributed to the news text ($p = .080$, $\beta = -.23$).

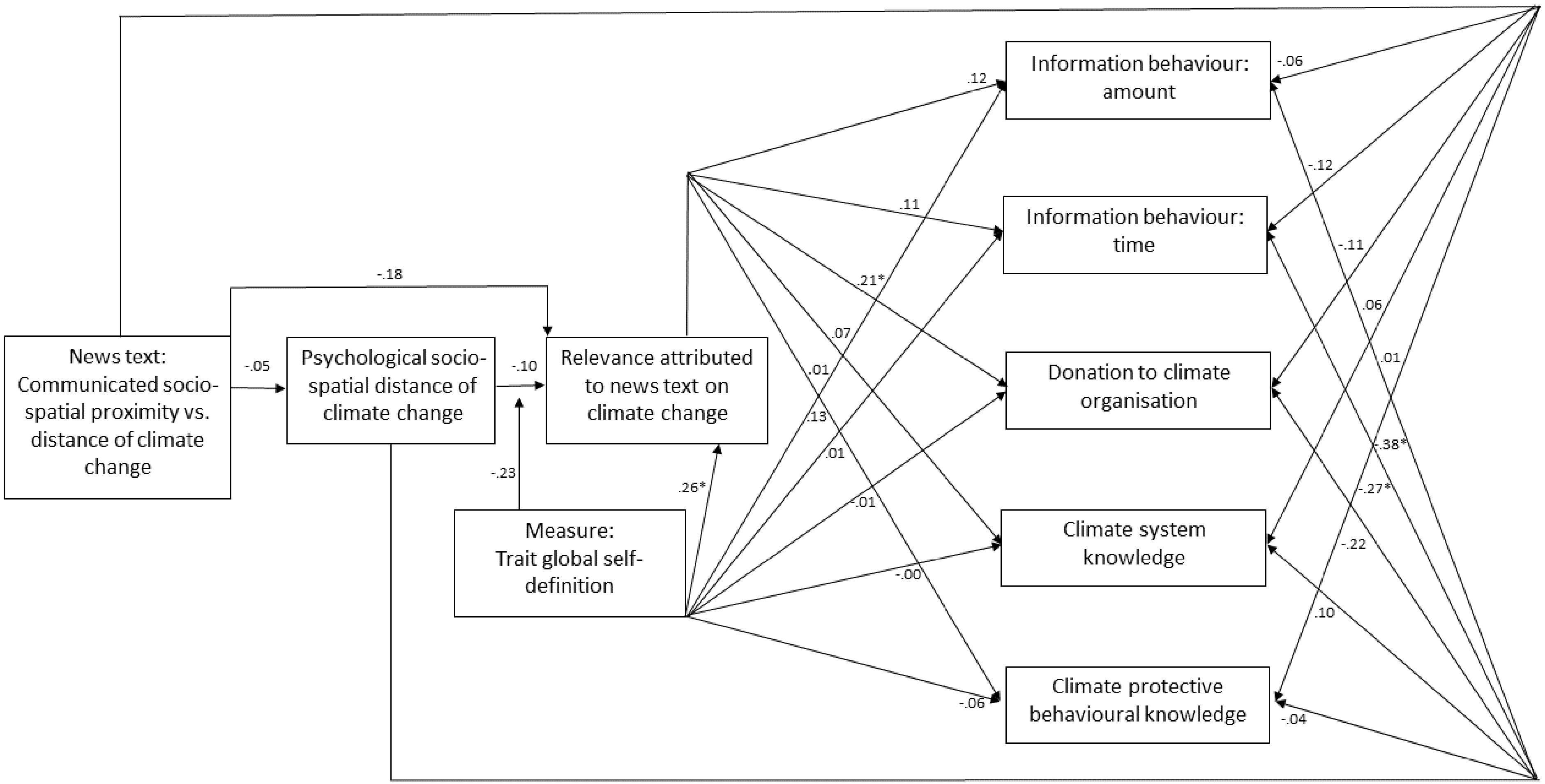


Figure 16. Moderated path model in Study 2 including the self-definition dimension of global identity.

Note. Standardised coefficients are displayed. * $p < .05$. Residual covariances between the behavioural and knowledge outcomes are not displayed to reduce complexity.

5.3.3.2 Models including the self-investment dimension of global identity

Unmoderated model including global self-investment as predictor. Again, I first calculated an unmoderated path model. The model fit the data well in terms of χ^2, CFI, and SRMR but not RMSEA. TLI could not be determined[18], $\chi^2(1) = 3.89$, $p = .049$; CFI = .97 (robust CFI = .96); RMSEA = .209, 90% CI [.031, .428] (robust RMSEA = .225, 90% CI [.014, .478]); SRMR = .045. The model explained 0.2% of the variance in psychological socio-spatial distance, 8.9% of the variance in relevance attributed to the news text on climate change, 25.3% of the variance in the amount of information viewed on climate protective engagement options, 14.1% of the variance in the time spent viewing this information, 11.6% of the variance in donations to the climate protection organisation, 4.4% of the variance in climate system knowledge, and 0.2% of the variance in climate protective behavioural knowledge. Figure 17 shows the standardised results.

As the results for H2.1 to H2.5 and RQ2.1 were identical to those of the model including global self-definition, I do not outline them in detail (they differed slightly with regard to the value of some coefficients but not in the general pattern, compare Figure 15 and Figure 17). The only difference with regard to statistical significance was that the direct relation between psychological socio-spatial distance and time spent viewing the information on climate protective behavioural options did not reach significance ($p = .081$).

In H2.6, I hypothesised that individuals' *global self-investment* positively predicts a) the relevance attributed to a news text about the climate change issue, b) climate protective behaviour, and c) climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge. H2.6a was not confirmed as there was no significant relation between global self-investment and relevance attribution, only a tendency ($p = .095$, $\beta = .25$).

In order to test H2.6b and H2.6c, I examined the total relations, including both the direct paths and the indirect paths through relevance attribution. Confirming H2.6b, global self-investment positively predicted all three indicators of climate protective behaviour: amount of information viewed on climate protective engagement options (total relation, $B = 1.23$, $SE = 0.43$, 95% CI [0.29, 2.01], $p = .005$, $\beta = .37$, direct relation, $B = 1.17$, $SE = 0.44$, 95% CI [0.15, 2.01], $p = .008$, $\beta = .35$, no indirect relation, $B = 0.06$, $SE = 0.13$, 95% CI [-0.18, 0.46], $p = .641$, $\beta = .02$), time spent viewing this information (total

[18] I will reflect on possible reasons for this in the discussion section.

relation, $B = 21.95$, $SE = 11.11$, 95% CI [0.51, 41.26], $p = .048$, $\beta = .27$, direct relation, $B = 20.90$, $SE = 10.55$, 95% CI [-0.38, 40.51], $p = .047$, $\beta = .26$, even though the bootstrapped CI included zero, no indirect relation, $B = 1.05$, $SE = 2.58$, 95% CI [-4.42, 8.79], $p = .684$, $\beta = .01$), and donation to the climate protection organisation (total relation, $B = 0.73$, $SE = 0.33$, 95% CI [0.03, 1.47], $p = .029$, $\beta = .20$, no significant direct relation, $B = 0.58$, $SE = 0.32$, 95% CI [-0.09, 1.33], $p = .069$, $\beta = .16$, no indirect relation, $B = 0.15$, $SE = 0.12$, 95% CI [-0.05, 0.48], $p = .198$, $\beta = .04$).

H2.6c was not confirmed as there were no total relations between global self-investment and climate system knowledge or climate protective behavioural knowledge ($ps \geq .187$, $\beta s \leq .15$). All direct and indirect paths were not significant ($ps \geq .240$).

Moderated model including global self-investment as predictor and moderator. In order to test H2.8, I included the interaction between psychological socio-spatial distance and global self-investment in the model. This changes the interpretation of the relations between psychological socio-spatial distance and relevance attribution as well as between global self-investment and relevance attribution to conditional relations (i.e., relation between psychological socio-spatial distance and relevance attribution at an average level of global self-investment and vice versa; see Figure 18). The model did not fit the data satisfactorily in terms of TLI and RMSEA, $\chi^2(7) = 11.25$, $p = .128$; CFI = .95; TLI = .72 (robust TLI = .71); RMSEA = .096, 90% CI [.000, .196] (robust RMSEA = .099, 90% CI [.000, .201]); SRMR = .057. It explained 0.2% of the variance in psychological socio-spatial distance, 11.4% of the variance in relevance attributed to the news text on climate change, 25.3% of the variance in the amount of information viewed on climate protective engagement options, 14.1% of the variance in the time spent viewing this information, 11.6% of the variance in donations to the climate protection organisation, 4.4% of the variance in climate system knowledge, and 0.2% of the variance in climate protective behavioural knowledge.

In H2.8, I hypothesised that the relation between the psychological socio-spatial distance of climate change and the relevance attributed to a news text about the climate change issue is moderated by individuals' global self-investment. The stronger people's global self-investment, the smaller the relation should be. This assumption was not confirmed, as there was no significant interaction between psychological socio-spatial distance and global self-investment in predicting relevance attributed to the news text ($p = .187$, $\beta = -.16$).

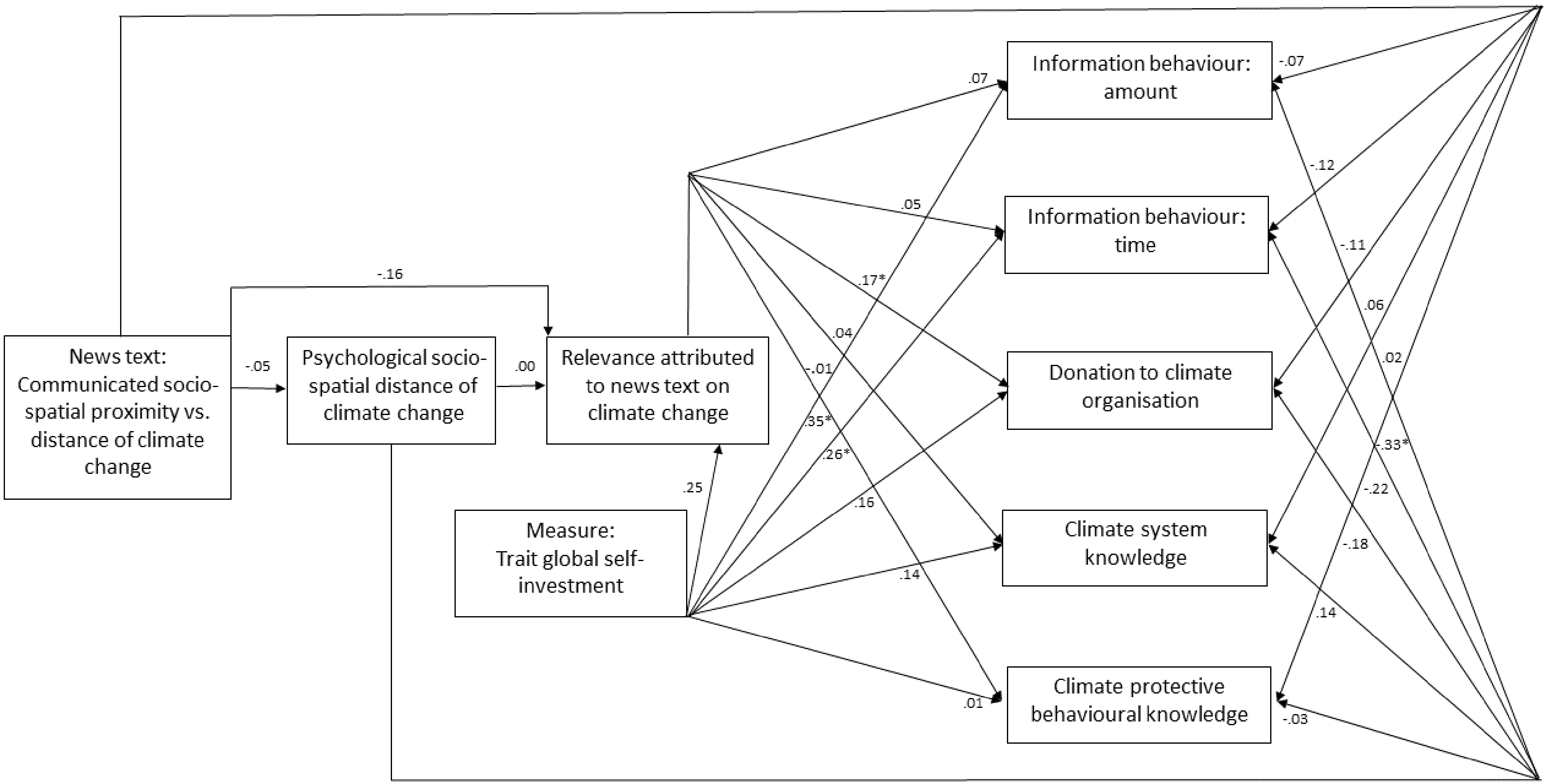


Figure 17. Unmoderated path model in Study 2 including the self-investment dimension of global identity.

Note. Standardised coefficients are displayed. * $p < .05$. Residual covariances between the behavioural and knowledge outcomes are not displayed to reduce complexity.

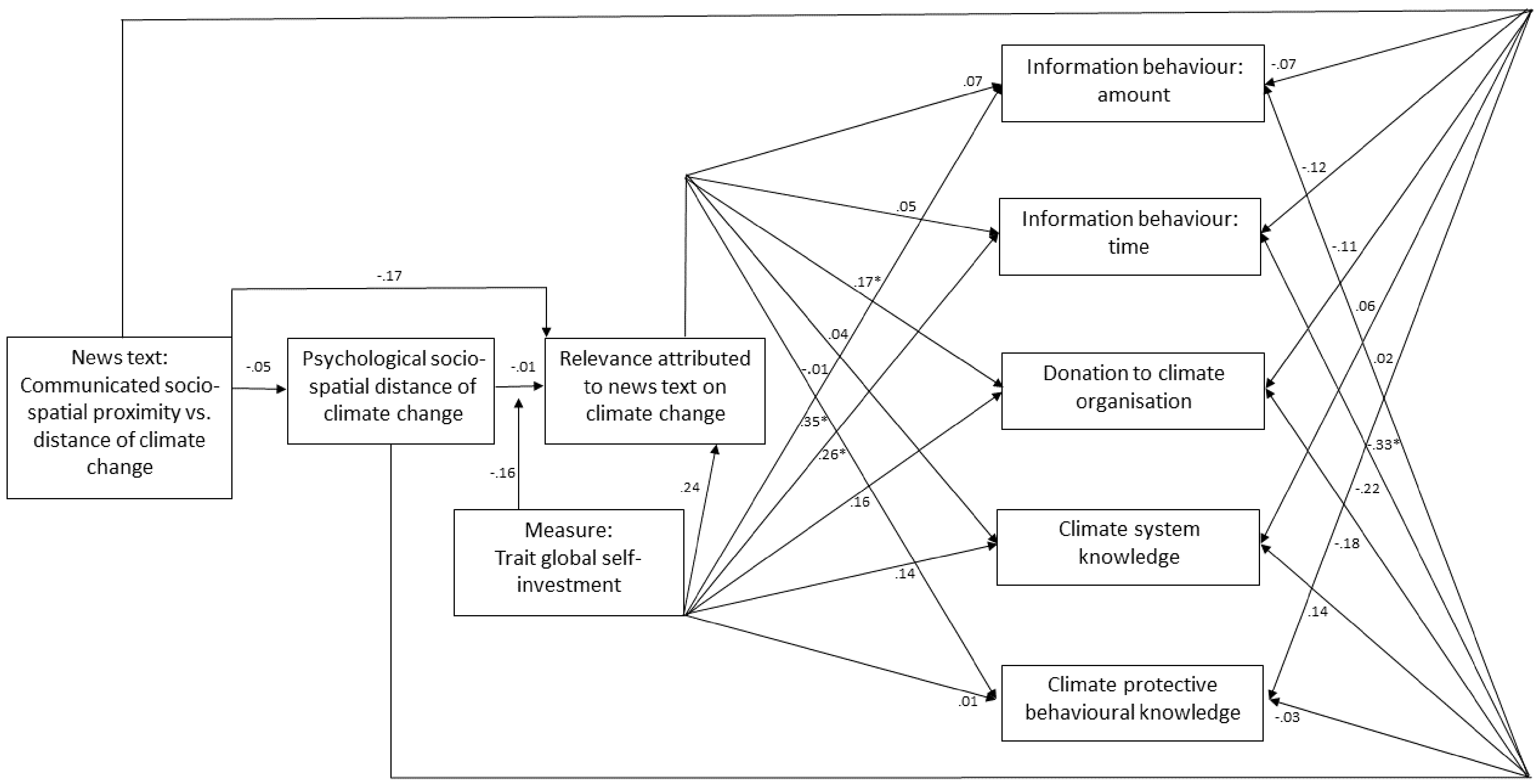


Figure 18. Moderated path model in Study 2 including the self-investment dimension of global identity.

Note. Standardised coefficients are displayed. * $p < .05$. Residual covariances between the behavioural and knowledge outcomes are not displayed to reduce complexity.

5.3.4 Additional analyses

5.3.4.1 Global identity and psychological socio-spatial distance

As additional path analyses, I examined whether the global identity dimensions of self-definition and self-investment interact with the communication of socio-spatial proximity vs. distance in order to see whether there are moderation effects one step earlier in the model.

The first model included global self-definition as well as its interaction with communication of socio-spatial proximity vs. distance as predictors of psychological socio-spatial distance. The model fit the data satisfactorily in terms of χ^2, CFI, and SRMR but not TLI and RMSEA, $\chi^2(6) = 9.63$, $p = .141$; CFI = .96; TLI = .71 (robust TLI = .75); RMSEA = .096, 90% CI [.000, .212] (robust RMSEA = .088, 90% CI [.000, .187); SRMR = .030. There was neither a conditional relation (i.e., in the distance condition, coded as 0) between global self-definition and psychological socio-spatial distance ($p = .999$, $\beta = .00$) nor a significant interaction between global self-definition and experimental condition (communication of socio-spatial proximity vs. distance) in predicting psychological socio-spatial distance ($p = .123$, $\beta = -.24$).

The second model included global self-investment as well as its interaction with communication of socio-spatial proximity vs. distance as predictors of psychological socio-spatial distance. The model did not fit the data satisfactorily, $\chi^2(6) = 15.02$, $p = .020$; CFI = .91 (robust CFI = .92); TLI = .36 (robust TLI = .44); RMSEA = .151, 90% CI [.048, .256] (robust RMSEA = .141, 90% CI [.052, .232); SRMR = .044. There was neither a conditional relation (i.e., in the distance condition, coded as 0) between global self-investment and psychological socio-spatial distance ($p = .357$, $\beta = -.16$) nor a significant interaction between global self-investment and experimental condition (communication of socio-spatial proximity vs. distance) in predicting psychological socio-spatial distance ($p = .385$, $\beta = -.14$).

5.3.4.2 Impact of exposure to the news text on climate change

To compare the experimental conditions with the control condition and hence examine the effects of exposure to the news text, I conducted a MANOVA with condition as the independent variable and psychological socio-spatial distance, the indicators of climate protective behaviour, climate system knowledge, and climate protective behavioural knowledge as dependent variables using factor scores and Rasch scores (see Table 11). The multivariate Shapiro-Wilk tests were significant in all three groups. Hence, multivariate normality cannot be assumed ($W^* = 0.92$, $p < .001$, in the proximity condition; $W^* = 0.94$, $p < .001$, in the distance condition; $W^* = 0.92$, $p < .001$, in the control condition). Using Pillai's trace, there was a significant effect of condition on the outcomes, $V = 0.33$, $F(6,92) = 7.41$, $p < .001$. Moreover, both the robust method by Munzel and Brunner using the *mulrank*() function ($F = 7.77$, $p < .001$) and the robust method by Choi and Marden using the *cmanova*() function ($H(12) = 57.18$, $p < .001$) indicated significant effects of condition (Wilcox, 2005).

Follow-up univariate ANOVAs revealed significant effects of condition on climate system knowledge ($F(1,97) = 23.36$, $p < .001$, $\omega^2 = .18$) and climate protective behavioural knowledge ($F(1,97) = 37.97$, $p < .001$, $\omega^2 = .27$). Planned contrasts showed that system knowledge was higher in the proximity condition ($M = -0.41$, $SD = 0.70$, $t(64) = 5.49$, $p < .001$, $d = 1.35$) and the distance condition ($M = -0.48$, $SD = 0.89$, $t(64) = 4.44$, $p < .001$, $d = 1.09$) compared to the control condition ($M = -1.34$, $SD = 0.67$). For behavioural knowledge, a significant Levene's test indicated that the assumption of homogeneity of variance was not met; therefore, Welch's adjusted test was used. Behavioural knowledge was also higher in the proximity condition ($M = 0.41$, $SD = 1.75$, $t(48.5) = 6.39$, $p < .001$, $d = 1.57$) and the distance condition ($M = 0.35$, $SD = 1.31$, $t(57.4) = 7.65$, $p < .001$, $d = 1.88$) compared to the control condition ($M = -1.78$, $SD = 0.92$). The p-values did not differ with a Bonferroni correction for three-group comparisons (Field et al., 2012, p. 447).

Table 11. Dependent variables in the three experimental conditions of Study 2

	Proximity condition	Distance condition	Control condition	
Variable	*M (SD)*	*M (SD)*	*M (SD)*	*F*
Psychological socio-spatial distance of climate change [a]	-0.05 (1.48)	0.08 (1.38)	-0.03 (1.38)	0.01
Climate system knowledge [b]	-0.41 (0.70)	-0.48 (0.89)	-1.34 (0.67)	23.36*
Climate protective behavioural knowledge [b]	0.41 (1.75)	0.35 (1.31)	-1.78 (0.92)	37.97*
Climate protective behaviour				
a. Information amount	2.39 (1.17)	2.58 (1.28)	2.67 (1.14)	0.87
b. Information time (sec)	37 (23)	45 (33)	44 (26)	1.04
c. Donation amount	0.52 (1.03)	0.85 (1.50)	0.64 (1.34)	0.14

Note. [a] Factor score. [b] Rasch scores. * $p < .05$

5.3.4.3 Contact with the climate change issue in the media

In this study, I did not assess contact with the climate change issue in communication in as differentiated a way as in Study 1. However, I examined the relations between the study variables and the 1-item indicator asking participants how often in the past they had come into contact with messages about climate change in the media. Contact with the issue was not significantly related to psychological socio-spatial distance of climate change, the relevance attributed to the received news text on climate change, the indicators of climate protective behaviour, and behavioural climate change knowledge ($-.10 \leq r_s \leq .13$, ps $\geq .216$). However, it positively predicted climate system knowledge ($r_s = .40$, $p < .001$).

5.4 Discussion

Just as for Study 1, I will discuss Study 2 in this section with respect to its main results as well as limitations and implications for Study 3. A discussion integrating all three studies will follow in Chapter 7.

5.4.1 Summary of results

5.4.1.1 Main research questions and hypotheses

In this study, I examined the assumed process behind a possible effect of proximising climate change on public engagement in a stepwise manner. First, I examined the hypothesis that communicating the socio-spatial proximity of climate change in a news text by focussing on local expected consequences in Germany (compared to communicating climate change as a distant phenomenon mostly impacting developing countries) reduces recipients' *psychological socio-spatial distance of climate change*. This assumption was not confirmed, as proximising climate change did not impact psychological socio-spatial distance (H2.1).

Second, I examined the hypothesis that the communication of socio-spatial proximity vs. distance of climate change in a news text positively predicts the *relevance attributed to the news text about the climate change issue* indirectly through lower psychological socio-spatial distance of climate change. This assumption was not confirmed, as proximising climate change did not indirectly predict the relevance attributed to the news text through psychological socio-spatial distance (H2.2). There was also no direct effect or total relation with relevance attribution.

Third, I examined the hypothesis that communication of socio-spatial proximity vs. distance of climate change in a news text positively predicts *climate protective behaviour* indirectly through lower psychological socio-spatial distance of climate change and higher relevance attributed to the news text about the climate change issue (serial indirect relation). This assumption was not confirmed, as proximising climate change did not indirectly predict the three indicators of climate protective behaviour (amount of information viewed on climate protective engagement options, time spent viewing this information, donation to climate protection organisation, H2.3). There were also no direct effects or total relations. However, the higher people's psychological socio-spatial distance, the less information on climate protective engagement options they viewed and the less time they devoted to them (direct relations). The more relevance people attributed to the news text on climate change, the more money they donated to the climate protection organisation atmosfair (direct relation).

Fourth, I examined the hypothesis that communication of socio-spatial proximity vs. distance of climate change in a news text positively predicts *climate change knowledge* in the form of climate system knowledge and climate protective behavioural knowledge indirectly through lower psychological socio-spatial distance of climate change and higher relevance attributed to the news text about the climate change issue (serial indirect relation). This assumption was not confirmed, as proximising climate change did not indirectly predict climate system knowledge and climate protective behavioural knowledge (H2.4). There were also no direct effects or total relations.

Hence, the evidence in this study does not suggest that proximising climate change might be a communicative means of reducing the psychological socio-spatial distance of climate change or increasing the perceived relevance of the issue among recipients. Moreover, it does not seem to be a promising strategy to motivate climate change knowledge and climate protective behaviour. However, the result that psychological socio-spatial distance of climate change was negatively related to two of the three indicators of climate protective behaviour indicates that perceiving the phenomenon as affecting mainly others in distant locations might prevent people from taking action for climate protection in some ways. Therefore, it might be still worthwhile to seek to reduce the psychological socio-spatial distance of climate change through communicative means. However, it has to be kept in mind that this result is correlational, not causal.

Fifth, I examined the hypothesis that climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge is positively related to climate protective behaviour. This assumption was not confirmed, as neither climate system nor climate protective behavioural knowledge were significantly related to any of the three indicators of climate protective behaviour (H2.5, RQ2.1). Hence, the results of this study do not suggest that knowledge is a precondition for climate protective behaviour or vice versa.

Sixth, I examined the hypothesis that individuals' *global identity* (distinguishing between the dimensions of self-definition and self-investment) positively predicts a) the relevance attributed to a news text about the climate change issue, b) climate protective behaviour, and c) climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge. These assumptions were not confirmed for the *global self-definition dimension,* as there was neither a direct relation between global self-definition and relevance attribution nor were there direct, indirect, or total relations between global self-definition and the three indicators of climate protective behaviour, climate system knowledge, and climate protective behavioural knowledge. For the *global self-investment dimension*, there was also no direct relation with relevance attribution and no direct, indirect, or total relations with climate system knowledge and climate protective behavioural knowledge. However, I found that global self-investment predicted the amount of information viewed on climate protective engagement options (significant total and direct relation, no significant indirect relation), time devoted to viewing this information (significant total and direct relation, no significant indirect relation), and donations to the climate protection organisation atmosfair (significant total relation, no significant direct and indirect relation, H2.6).

These results can be interpreted as an indication that increasing global self-investment might foster climate protective behavioural engagement. However, it has to be kept in mind that the causal direction cannot be reliably inferred from this study's correlational evidence. The result that global self-investment but not self-definition predicted the indicators of climate protective behaviour seems plausible, as this subdimension of global identity captures propensity for activism to meet global challenges.

Finally, I examined the hypothesis that the relation between the psychological socio-spatial distance of climate change and the relevance attributed to a news text about the climate change issue is moderated by individuals' global self-definition and self-investment. The stronger people's global self-definition and self-investment, the smaller the relation should be. This assumption was not confirmed, as there were no significant interactions between psychological socio-spatial distance and either global self-definition or self-investment in predicting the relevance attributed to the news text. The relevance attributed to the climate change communication was unrelated to the psychological socio-spatial distance of climate change regardless of the strength of people's global self-definition and self-investment (H2.8). This seems to indicate that psychological socio-spatial distance can be bridged by people regardless of the strength of their global identity (i.e., relevance attribution does not depend on perceiving climate change as affecting oneself and one's local area).

5.4.1.2 Additional analyses

In order to examine the baseline effect of news exposure, I compared the experimental groups, who had received the news text on climate change, with the control group, who only received the news text after answering the questions regarding the dependent variables. Receiving the news texts did not influence psychological socio-spatial distance of climate change and the three indicators of climate protective behaviour. However, both the text communicating climate change as proximal as well as the text communicating climate change as distant increased climate system knowledge and climate protective behavioural knowledge, which were communicated in the text. The 1-item measure asking participants how often in the past they had come into contact with messages about climate change in the media was not related to psychological socio-spatial distance of climate change, climate protective behaviour, or climate protective behavioural knowledge, but positively predicted climate system knowledge. These results indicate that existing climate change communication in the media might tend to convey climate system knowledge rather than climate protective behavioural knowledge. Hence, policymakers may wish to reflect on whether media content could be expanded similarly as was done in the news text in this study, which I found to be an effective means of conveying not only climate system but also climate protective behavioural knowledge.

5.4.2 Limitations and implications for developing Study 3

The most important limitation of Study 2 is its small sample size, which limits its power to detect effects of small to medium size. The decision to limit sample size to a minimum arose out of the reasoning that due to the standardised and controlled laboratory setting, effect sizes might be larger than in an online field context. I am aware that the small sample size is particularly problematic with regard to the path analyses. The fit indices of the models were not satisfactory. This could be a consequence of the small sample size. However, it could also have resulted from the confirmatory use of path modelling to test my hypotheses. The results showed that many of the specified paths did not represent correlations. Too many paths not representing correlations can result in poor model fit. In particular, TLI, which is sensitive to model complexity, was either poor or could not be determined. This suggests that the models were too complex in light of the small sample size. Moreover, the unmoderated models only contained one degree of freedom, which can also result in impaired model fit. In the follow-up Study 3, I aimed to acquire a larger sample in order to increase test power and be able to detect even small effects, as well as to improve the conditions for conducting path modelling.

Moreover, Study 2 was conducted with a student sample, and the results are thus restricted in their generalisability. In Study 3, I aimed to acquire a more varied sample in order to examine my research questions beyond a student population. This is achieved more easily in an online rather than a laboratory setting and by working with a panel provider.

Study 2 was conducted in a laboratory setting in order to maximise internal validity (i.e., standardised setting, control of external influences). In Study 3, however, I sought to focus on external validity (i.e., studying online news consumption in individuals' natural environment).

In Study 2, I varied socio-spatial proximity vs. distance in the news text on climate change by either communicating the consequences of climate change for Germany or portraying climate change as a global challenge mainly affecting developing countries. In Study 3, I varied the communication of climate change consequences in the text between two countries in order to keep the content even more constant.

Similar to Study 1, the measure of psychological distance did not result in optimal factor loadings for the temporal and hypothetical distance dimensions. The measure was improved in Study 3 on the basis of the CFA as well as comments in the open answer section (see Chapter 6.2.4.1). The Rasch analysis for the knowledge items regarding the content of the news text revealed that overall the measure was slightly too difficult, as indicated by a mean value of the person parameters below zero. Some items were exchanged in Study 3 (see Chapter 6.2.4.3). Donations to the climate protective organisation atmosfair were very low, meaning that the measure was skewed accordingly (i.e., a mean of 0.67 on a possible range of 0 to 5). Hence, the organisation might have been considered irrelevant or untrustworthy. Future research should conduct a qualitative pretest. Moreover, instead of proposing that participants donate their limited study compensation, future research could provide the opportunity to donate an unlimited amount. A limitation of this strategy is the likelihood that participants will have different amounts or no money available in a laboratory study context. Hence, money transfer options as a follow-up could be considered. In contrast to Study 1, the trait measure of global identity did not perform optimally in the CFA in this study in terms of factor loadings, internal consistency and AVE. A possible explanation for the differences might lie in the less varied and smaller sample of Study 2 compared to Study 1. However, the trait measure of social identity including global identity was not included in Study 3 and therefore not further improved. Instead, a state measure of global identity was developed (see Chapter 6.2.4.5) in order to examine whether global identity can be made salient by communicative means.

6. Study 3: Online Experiment

This study was conducted during a 10-week research stay at the University of Nottingham with Dr Alexa Spence in the time period between October 14 and 25, 2016. The research stay was funded by the German Academic Exchange Service (DAAD). The expenses for the panel provider were covered by a grant from the UK Engineering and Physical Sciences Research Council given to Alexa Spence (EP/K002589/1). Because the study was conducted in the UK, I needed to obtain ethics approval, which was received by the Ethics Committee of the University of Hohenheim on August 24, 2016.

6.1 Background

6.1.1 Specific aims of the study

In this study, the previous approaches were extended with respect to the following aims:

- By conducting an online experiment outside the laboratory, the *focus lay on external validity* (i.e., studying online news consumption in individuals' natural environment).
- A *more varied sample* was aspired to in order to examine the research questions beyond a student population (see Study 2). This is achieved more easily in an online rather than a laboratory setting and by working with a panel provider.
- A larger sample was aspired to in order to *increase test power*.
- Socio-spatial proximity vs. distance in a news text on climate change was still varied. However, in order to *keep the content even more constant*, the variation consisted of the country for which climate change consequences were discussed (UK vs. Bangladesh) instead of talking about the UK vs. developing countries in general (in contrast to Study 2, where the news text either communicated consequences of climate change for Germany or portrayed climate change as a global challenge mainly for developing countries).
- A *state measure of global identity* was developed in order to examine a) whether this is related to the dependent variables of interest and b) whether it is influenced by communicative means aimed at making global identity salient.

6.1.2 Main research questions and hypotheses

The research questions and hypotheses partly parallel Study 1 and Study 2. However, they extend these studies by introducing a situational approach to examining global identity. Hence, the general hypotheses on global identity as a trait, H6 and H8, were only addressed in Study 1 and Study 2.

H3.1: Communication of socio-spatial proximity vs. distance of climate change in a news text reduces recipients' *psychological socio-spatial distance* of climate change.

H3.2: Communication of socio-spatial proximity vs. distance of climate change in a news text positively predicts the *relevance attributed to the news text about the climate change issue* indirectly through lower psychological socio-spatial distance of climate change.

H3.3: Communication of socio-spatial proximity vs. distance of climate change in a news text positively predicts *climate protective behaviour* indirectly through lower psychological socio-spatial distance of climate change and higher relevance attributed to the news text about the climate change issue (serial indirect relation).

H3.4: Communication of socio-spatial proximity vs. distance of climate change in a news text positively predicts *climate change knowledge* in the form of climate system knowledge and climate protective behavioural knowledge indirectly through lower psychological socio-spatial distance of climate change and higher relevance attributed to the news text about the climate change issue (serial indirect relation).

H3.5: Climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge is positively related to climate protective behaviour.

RQ3.1: Is the relation with climate protective behaviour different for climate system knowledge compared to climate protective behavioural knowledge?

H3.7: Making global identity salient increases a) the relevance attributed to a news text about the climate change issue, b) climate protective behaviour, and c) climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge.

H3.9: The relation between the psychological socio-spatial distance of climate change and the relevance attributed to a news text about the climate change issue will be moderated by global identity salience. More specifically, the negative relation between psychological socio-spatial distance and relevance attribution will be weaker if global identity is made salient.

6.1.3 Additional research questions

The first additional research question addressed the explicit measure of situational global identity inferred for this study:

RQ3.2: Does making global identity salient (i.e., in a video) before the reception of a news text about climate change increase scores on the explicit measure of global identity salience?

To my knowledge, no prior study on climate change has examined not only psychological distance but also construal level, as suggested by CLT (Trope & Liberman, 2010). Moreover, empirical measures of construal level have not yet been developed. Therefore, in this study, a first idea for how to measure climate change-related construal level was tested. Moreover, the following research questions were inferred from the assumptions made by CLT:

RQ3.3: Is the new measure of construal level (general and climate change-related) related to the psychological distance of climate change?

RQ3.4: Does the communication of socio-spatial proximity vs. distance of climate change in a news text influence recipients' construal level (general and climate change-related) as assessed by the new measure?

A control group receiving no stimuli was included in order to estimate the effects of exposure to a news text about climate change on the outcomes, just as was done in Study 2.

6.2 Method

6.2.1 Participants

As more noise is to be expected in online compared to laboratory experiments and as Study 2 suggested that there might be small relations that were undetected due to a lack of test power, sample size was increased. Using G*Power 3, I determined the sample size necessary to find effects of small size (f^2 = .02) at p < .05 with 90% power for a design with two factorial independent variables plus a control group and hence five conditions (see

Chapter 6.2.2) and eleven dependent variables (i.e., psychological socio-spatial distance, relevance attribution, four indicators of climate protective behaviour, behavioural intention, climate system knowledge, climate protective behavioural knowledge, and, additionally to Study 2, climate-related construal level and situational global identity) in a multivariate analysis of variance. The resulting necessary sample size was 450. This was expanded to around 500 people to allow for a reduction in data due, for example, to technical problems watching the video used as a stimulus.

The panel provider Lightspeed GMI was commissioned for the recruitment of participants. They incentivise participants with rewards points or prize draws. With the consent of the panel provider, participants who answered the questionnaire too quickly, in less than 40% of the median response time, were excluded. (This led to the exclusion of n = 38 participants). In order to gain a varied sample, a cross quota of age group and gender was applied based on the 2011 UK census.[19] The final sample consisted of N = 508 participants (n = 264 females, M = 47.5 years of age, SD = 16.3; see Table 12).

The sample was varied with regard to participants' highest educational or professional qualification, with n = 30 participants reporting no formal qualifications, n = 3 still studying, n = 112 with GCSE/O-level/CSE, n = 44 with vocational qualifications (=NVQ1+2), n = 104 A-level or equivalent (=NVQ3), n = 152 a bachelor's degree or equivalent (=NVQ4), n = 43 a master's degree, n = 11 a PhD or equivalent, n = 5 other, and n = 4 did not know. Regarding current work status, n = 218 participants were working full-time (30+ hours per week), n = 57 were working part-time (9-29 hours per week), n = 31 were unemployed, n = 117 were retired, n = 35 were looking after the house/children, n = 27 were disabled, n = 16 were students, and n = 7 named another status. All participants currently lived in the UK, n = 498 considered the UK their home, n = 412 were planning to live in the UK in the future.

[19] In contrast to Study 1, no quota for education was used for two reasons. First, the study did not aim to test measures and relations between the variables of interest in a sample that mirrored the population. The aim was instead to test the effects of the experimental manipulations with a varied sample. Second, a quota for education would have raised the price for the study considerably and exceeded the budget. Nevertheless, variation in educational background was achieved.

Table 12. Demographic characteristics of the sample in Study 3 resulting from the quota procedure compared to the UK population

	Proportion in sample (%)	Proportion in 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

Note. [a] Based on the 2011 UK census

6.2.2 Design and procedure

The study was again programmed with the software package SoSci Survey. The online experiment was presented as a study on the perception of media content. Participants were asked to make sure that they were situated in quiet surroundings and that they used a device which was large enough to read a page of text easily and view multimedia content. In order to check for eligibility and apply quota sampling, participants first indicated their age, gender, and country of residency.

Participants were then randomly assigned to one of five conditions in a 2 (video: connectedness vs. control) × 2 (news text: proximity vs. distance) + 1 (control: no stimuli) between-subjects design. Participants in the four experimental groups first saw either a video depicting the connectedness of people all over the world or a control video. Next, they were provided with a news text on climate change and its consequences for either the UK or Bangladesh. The control group received neither a video nor a news text. Of the N = 508 participants, n = 100 were in the connectedness video + proximity text condition, n = 98 in the connectedness video + distance text condition, n = 99 in the control video +

proximity text condition, n = 103 in the control video + distance text condition, and n = 108 in the no stimulus control condition.

Participants in the experimental groups answered a questionnaire after stimuli presentation on the psychological distance of climate change, the relevance they attributed to the news text, climate change knowledge covered in the news text, indicators of climate protective behaviour and behavioural intentions, situational global identity, global connectedness, control questions regarding the video as well as a manipulation check, perceived communicated distance of climate change in the news text as a manipulation check for the text variation, construal level, their climate change-related media experience, as well as some further control questions (instrumentality, educational qualification, working status, relation to the UK, and environmental concern). The questionnaire ended with an awareness check, space for comments, and a debriefing. Participants in the control group received the same questions with a slightly different introduction that did not refer to the news text (e.g., the knowledge questions were introduced as questions on the IPCC report) and skipping questions that directly referred to the stimulus material (e.g., the manipulation checks).[20]

6.2.3 Stimulus material

6.2.3.1 Video varying in communicated feeling of connectedness

In the experimental conditions, participants read that they will view a short video and that it will be referred to later in the questionnaire. They were asked to watch the video in its entirety. The stimulus aimed at communicating a feeling of connectedness consisted of the video applied in the study by Kitzmann (2015), which was also used by Kirsner (2011) and Krämer et al. (2016, see Chapter 2.5.3). It showed a man dancing with people all over the world, displaying the names of the respective locations. Scenes from the full-length video "Where the hell is Matt 2008"[21] were cut to create a shortened version of 1:30 minutes (connectedness condition). The control stimulus was of equal length and displayed an underwater world with fish (control condition). This video was also applied in the study by Kitzmann (2015). The sound in both videos was kept constant (i.e., the

[20] Hence, in contrast to Study 2, duration of participation was not kept constant in this study. In Study 2, keeping study participation constant was necessary because people in the different conditions were present in the laboratory at the same time due to the random allocation. This was not the case here due to the individual online setting.
[21] https://www.youtube.com/watch?v=zlfKdbWwruY

song used in the video "Where the hell is Matt 2008"). I received permission from Matt Harding to use and adapt his video for the study.

I reasoned that beyond communicating a feeling of connectedness (see Kirsner, 2011; Kitzmann, 2015), the video might also have the potential to make global identity salient, as it shows people from all over the world united and communicates their similarity through the joy of dancing. Accordingly, comments on the platform YouTube read, for example, "This video is beautiful because it brings home the fact that all of us - all humans - are essentially the same deep down" or "It's like we're all connected after all". Krämer et al. (2016) used the video as a stimulus with a similar reasoning, as suggesting "the similarities of humankind" (p. 8). They found that the video increased participants' universal orientation, defined as "valuing similarities over differences between others and oneself" (p. 6), compared to a control video.

Participants were asked at the end of the study whether they had seen the whole video and whether technical problems arose. As *n* = 13 participants reported having technical problems watching the video and *n* = 34 indicated that they did not watch the whole video, the analyses including the video variable were repeated for the subsample excluding these participants.

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

As in Study 2, participants in the experimental conditions were asked to read an online news article without any further instructions in order to increase the external validity with respect to news reception (see Chapter 5.2.3). The online news text (see Appendix 4) outlined scientific knowledge on climate change and its consequences (see Schoenefeld & McCauley, 2016; Spence & Pidgeon, 2010) as well as suggested solutions (see Scannell & Gifford, 2013). Implementing the communication strategy of proximising climate change by focussing on local consequences, the *communicated socio-spatial distance of climate change in the news text* was varied. The news text either communicated consequences affecting the UK (proximity condition) or Bangladesh (distance condition; see Jones et al., 2017; Spence & Pidgeon, 2010). The specific contents and wording were kept constant for maximum standardisation (i.e., consequences were selected that are expected in both the UK and Bangladesh, such as flooding). The text was adapted from the German news article constructed for Study 2. Hence, it also referred to the IPCC report (2014). News articles from the British media outlets BBC and The Guardian were consulted to identify typical wording and content portrayals.[22] Moreover, I consulted sources regarding expected effects of climate change for the UK and Bangladesh in order to ensure the factual correctness of information that could be communicated identically for the UK and Bangladesh (Committee on Climate Change, 2016; Met Office, 2011b, 2011a).

As in Study 2, the text included knowledge content similar to the climate change knowledge measure by Tobler et al. (2012) and Shi et al. (2015), extended to also include content from the measure by Frick et al. (2004). The news article was titled "The future of the UK/Bangladesh with climate change". It covered *climate system knowledge* in the form of physical knowledge on CO_2 and the greenhouse effect as well as climate change and its causes (i.e., sections titled "How much has the temperature risen and why?", "How hot could it get?", "What is the relation between climate change and sea level rise?") and consequences of climate change (i.e., sections titled "What are the consequences of climate change for people in the UK/Bangladesh?", "What is the relation between climate change and resources?", "Does climate change affect conflicts?"). Moreover, it covered *climate protective behavioural knowledge* regarding climate-relevant actions and their effectiveness (i.e., section titled "How can we react to climate change?"). The only differences in the text versions were exchanging the words "the UK" for "Bangladesh". The UK text included 1276 words and a picture showing flooding in Ramsgate (UK). The Bangladesh text included 1267 words and a picture showing flooding on the Brahmaputra plains (Bangladesh). Both pictures displayed characteristic houses for the respective regions surrounded by high water.

6.2.4 Measures

Table 13 provides an overview of the characteristics of the scales used in the study, which are outlined below.

[22] Article in Süddeutsche Zeitung: http://www.sueddeutsche.de/wissen/erderwaermung-was-forscher-ueber-den-klimawandel-wirklich-wissen-1.2757138; article in BBC: https://www.bbc.com/news/science-environment-24021772; article in The Guardian https://www.theguardian.com/environment/2013/oct/08/potential-impacts-climate-change-uk

Table 13. Psychometric properties of the measures used in Study 3

Variable	*n*	*M*	*SD*	range	items	α	ω	AVE	R_P
Psychological distance of climate change (4-dim)	508	3.98	1.18	1.00–7.00	13	.91	.96	.73	-
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	400[b]	5.55	1.31	1.00–7.00	5	.94	.94	.76	-
Climate system knowledge [a]	508	-2.28	1.42	-5.11–1.33	28	.83	-	-	.81
Climate protective behavioural knowledge [a]	508	-1.27	1.29	-3.42–3.40	11	.65	-	-	.64
Climate protective behaviour									
Information amount	508	1.64	1.48	0.00-4.00	-	-	-	-	-
Information time (in sec)	505[c]	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[d]	40,613	30,019	0-100,000	-	-	-	-	-
Climate protective behavioural intentions [a]	498[e]	-0.19	1.00	-4.16–3.80	24	.67	-	-	.72
Situational global identity									
Situational global self-definition dimension	508	3.21	1.53	1.00–7.00	5	.95	.95	.79	-
Situational global self-investment dimension	508	3.96	1.51	1.00–7.00	5	.95	.95	.78	-
Global connectedness	507[f]	5.02	1.22	1.00–7.00	5	.91	.91	.67	-
Construal level									
General construal level dimension	508	41.0	20.8	0.0–100	4	.82	.82	.54	-
Climate-related construal level dimension	508	43.8	24.2	0.0–100	4	.92	.92	.75	-

Note. Displayed are mean scores, standard deviations, and ranges of the scales analysed according to classical test theory based on raw scores instead of the factor scores used in the later models. As factor scores are centred around 0, the raw scores give a better impression of how participants answered the scales with regard to the answer format used. [a] Results are based on Rasch analyses. [b] Only measured in experimental conditions. [c] Three outliers were excluded. [d] 11 cases with implausible values were excluded. [e] Ten cases had to be excluded due to too many missing variables, as no person estimates could be determined. [f] One case with missing values was excluded.

6.2.4.1 Psychological distance of climate change

Based on the factor analyses of the items used in Study 1 and Study 2, which were adapted from Spence et al. (2012) and Jones et al. (2017), the scale was improved and translated into English (see Table 14). Items with the strongest factor loadings were kept and items with low factor loadings were replaced. Due to participants' complaints about the questions being redundant, the wording was varied slightly more without substantially changing the meaning. Parallel wording was used for the social, spatial, and temporal dimensions. Moreover, the wordings of the items for the hypothetical dimension were aligned so that each item started with "I am uncertain" instead of "I am uncertain", "It is uncertain", and "There is little agreement", as one's own uncertainty and the perceived uncertainty of others might represent different subdimensions of hypotheticality, which might have been why the items did not load satisfactorily on one common factor. Psychological social distance was measured with three items (M = 4.07, SD = 1.52, range = 1.00 – 7.00), and psychological spatial distance was measured with four items (M = 3.83, SD = 1.61, range = 1.00 – 7.00). The fourth item of the spatial dimension was directly related to the experimental variation of communicated distance of climate change consequences in the UK vs. Bangladesh. It asked whether the impacts of climate change are primarily experienced in developing countries (actually, psychological social and spatial distance are confounded here, but the item loaded more strongly on spatial distance). Psychological temporal distance (M = 4.78, SD = 1.31, range = 1.00 – 7.00) as well as psychological hypothetical distance (M = 3.29, SD = 1.53, range = 1.00 – 7.00) were each measured with three items.

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 (robust CFI = .97); TLI = .95; RMSEA = .058, 90% CI [.049, .067] (robust RMSEA = .070, 90% CI [.057, .083]); SRMR = .046. Factor loadings were ≥ .63. The loading of the dimensions on the superordinate factor were .99 for psychological social distance, .93 for psychological spatial distance, .58 for psychological temporal distance, and .48 for psychological hypothetical distance. Cronbach's alphas were α = .83, .95, .86, and .89, omegas were ω = .84, .95, .86, and .89, AVE = .64, .83, .67, and .73, respectively. Hence, all psychometric properties were satisfactory apart from the loading of the hypothetical dimension on the superordinate factor, which should be higher than .55 to be regarded as good.

Psychological socio-spatial distance of climate change. As in Study 1 and Study 2, the research questions and hypotheses focussed on the psychological social and spatial distance dimensions as the communication strategy of proximising climate change addresses these dimensions in a confounded way. Hence, a variable reflecting both dimensions was built (i.e., psychological socio-spatial distance). First, I calculated a CFA for a 2-dimensional model with correlating factors (psychological social and spatial distance). The analysis yielded satisfactory model fit, $\chi^2(13) = 33.31$, $p = .002$; CFI = .98 (robust CFI = .99); TLI = .97 (robust TLI = .98); RMSEA = .055, 90% CI [.039, .072] (robust RMSEA = .079, 90% CI [.046, .113]); SRMR = .016. Factor loadings were .63, .87, and .85 for social distance, and .92, .93, .93, and .86 for spatial distance. The covariance between the dimensions was .92. Cronbach's alphas were α = .83 and .95, omegas ω = .84 and .95, and AVE = .64 and .83, respectively. Hence, all psychometric properties were satisfactory. I calculated the mean of the factor scores for the psychological social and spatial distance dimensions (M = 0.00, SD = 1.29, range = -2.39 – 2.59) as the indicator of *psychological socio-spatial distance* included in the models for examining my research questions.

Table 14. Measure of psychological distance of climate change in Study 3

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.

6.2.4.2 Relevance attributed to the news text on climate change

The questions used in Study 2 based on Weber and Wirth (2013) and Spence and Pidgeon (2010) were translated into English. Participants in the experimental conditions were asked to "think about the article they just read". They answered five questions on a 7-point semantic differential: "The article is… uninteresting – interesting, unimportant – important, irrelevant – relevant, meaningless – meaningful, useless – useful" (M = 5.55, SD = 1.31, range = 1.00 – 7.00; note that the measure is rather skewed).

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] (robust RMSEA = .028, 90% CI [.000, .131]); SRMR = .011. Factor loadings were .89, .89, .91, .78, and .89; Cronbach's α = .94, ω = .94., AVE = .76. Hence, all psychometric properties were satisfactory.

6.2.4.3 Climate change knowledge

The climate change knowledge measure was closely based on the questions used in Study 2, which were in turn based on Tobler et al. (2012), Shi et al. (2016), and Frick et al. (2004). They were translated into English (see Table 15). Again, the respective information was provided in the news text. Some questions were improved upon or replaced based on participants' answers in Study 2. Moreover, some items needed to be adapted in order to apply to the UK and/or Bangladesh. The measure included eight open questions and 10 multiple choice questions with four answer options as well as the option "I don't know". For questions with an open answer format, I coded predefined correct answers (i.e., information covered in the text) as 0 (*absent*) or 1 (*present*). As some questions required more than one answer to fully cover the given information, a corresponding number of items was generated. Answers that were correct but not part of the stimulus text were not coded. In total, the measure consisted of 18 questions resulting in 39 items (M = 8.70, SD = 5.63, range = 0 – 31). This mean indicates that the knowledge measure was rather difficult for participants.

Climate system knowledge. Two open questions covered system knowledge in the form of physical knowledge on CO_2 and the greenhouse effect. Each question had three coded answers, thus resulting in six items. System knowledge on climate change and its causes was assessed with four multiple choice questions and one open question with two coded answers, thus resulting in six items. System knowledge on consequences of climate change was assessed with three open questions with six, six, and four coded answers, respectively, thus resulting in sixteen items.

Climate protective behavioural knowledge. Behavioural knowledge in the form of action knowledge was assessed with two multiple choice questions and two open questions with two and three coded answers, respectively, thus resulting in seven items. Finally, behavioural knowledge in the form of effectiveness knowledge was assessed with four multiple choice questions.

Table 15. Measure of climate change knowledge in Study 3

Correct answers for multiple-choice questions are marked in bold face. Coded answers for the open questions are displayed.		
Climate system knowledge		
Physical knowledge CO_2 and greenhouse effect	**Infit**	**δ**
1. Which greenhouse gases contribute to warming the climate? (*open question*)		
(1) CO_2	0.86	-2.44
(2) Methane (also coded: CH_4)	0.89	-0.34
(3) Laughing gas (also coded: N_2O, nitrous oxide)	0.88	1.95
2. Which fossil fuels accelerate the warming of the climate? (*open question*)		
(1) Gas	0.87	-0.51
(2) Oil (also coded: gasoline, petrol, fuel, kerosene, diesel)	0.85	-1.56
(3) Coal	0.91	-2.33
Climate change and its causes	**Infit**	**δ**
3. How much was the global temperature rise between 1880 and 2012? a) About 0.4 degrees b) **About 0.8 degrees** c) About 1.3 degrees d) About 2 degrees e) I don’t know.	1.18	-1.78
4. In which time period do the ten warmest years since the beginning of systematic measurement fall? a) After 1917 b) After 1957 c) After 1987 d) **After 1997** e) I don’t know.	1.04	-2.17
5. According to the scenario of the IPCC, when do greenhouse gas emissions have to massively drop in order to limit global warming to 1.5°C compared to the pre-industrial era? a) **2030** b) 2050 c) 2070 d) 2100 e) I don’t know.	1.13	-1.00

6. How high was the sea level rise in the 20th century? a) 9 cm b) **19 cm** c) 39 cm d) 59 cm e) I don't know.	1.09	-0.75
7. Why is the sea level rising? (*open question*)		
(1) Ice of poles and glaciers melting	0.86	-2.75
(2) Permafrost thawing	0.81	1.57
Climate change consequences	**Infit**	**δ**
8. Which weather phenomena are expected to increase due to climate change? (*open question*)		
(1) Heat waves (also coded: extreme temperature rise)	1.00	0.15
(2) Drought	0.77	-0.09
(3) Strong rainfall (also coded: monsoons)	0.89	0.97
(4) Storms (also coded: hurricane, tornado, typhoon, winds, cyclone)	1.10	-1.02
(5) Flooding (also coded: tsunami, high water)	1.14	-0.66
(6) Forest fire	0.92	3.03
9. Which health risks are expected to increase due to climate change? (*open question*)		
(1) Cardiovascular diseases (also coded: chest, heart attack)	0.85	0.32
(2) Diseases transmitted by insects (also coded: malaria, tropical diseases)	0.96	-0.07
(3) Lowered air quality (also coded: pollution, smog)	0.89	1.88
(4) Breathing problems, asthma, lung diseases (not mentioned explicitly in the article but can be reasonably inferred)	1.11	0.58
(5) Food supply (also coded: nutrition, starvation, crop shortage, famine)	1.00	1.23
(6) Water supply (also coded: dehydration)	1.06	1.32
10. Which food supplies could be negatively impacted by climate change? (*open question*)		
(1) Fish (also coded: seafood)	1.01	1.23
(2) Rice	0.97	0.66
(3) Wheat	0.92	1.00
(4) Corn (also coded: maize)	0.90	1.62
Climate protective behavioural knowledge		
Climate-relevant actions	**Infit**	**δ**
11. How can energy be saved regarding laptop use? (*open question*)		
(1) Not use stand-by mode (also coded: switch off)	0.96	-0.78
(2) Disconnect after charging	0.96	0.87
12. In which months can you buy seasonal tomatoes grown in the UK? a) February to November b) April to October c) **June to October** d) July to November e) I don't know.	1.02	-0.93
13. In which months can you buy seasonal strawberries grown in the UK? a) February to November b) April to October c) May to November d) **June to September** e) I don't know.	0.98	-0.95

	Infit	δ
14. What are typical local fruits and vegetables that are available in the UK in the winter months? (*open question*)		
(1) Apples	1.00	-0.07
(2) Beetroot (also coded: root vegetables)	0.84	0.96
(3) Cabbage *https://www.bbcgoodfood.com/seasonal-calendar/all*	0.92	0.41
Effectiveness of climate relevant actions	**Infit**	**δ**
15. How much CO_2 is emitted during a flight compared to train travel over the same distance in the UK? a) About twice as much b) **About 5 times as much** c) About 20 times as much d) About 50 times as much e) I don't know. *https://blog.gopili.co.uk/travel/britons-can-cut-half-of-their-co2-emissions-when-travelling-by-changing-their-transportation-habits/*	1.10	0.32
16. How much money can be saved in British households on a bill of £500 by switching things off rather than leaving them on stand-by? a) £8 b) £18 c) **£80** d) £180 e) I don't know. *http://www.thegreenage.co.uk/the-cost-of-leaving-appliances-in-standby-mode/*	0.99	-0.82
17. How much CO_2 is emitted during the production of energy from coal as compared to wind energy? a) About one third b) About 7 times as much c) About 30 times as much d) **About 70 times as much** e) I don't know. *https://en.wikipedia.org/wiki/Life-cycle_greenhouse-gas_emissions_of_energy_sources#cite_note-NREL-LCA1-1*	1.03	0.58
18. How much greenhouse gases are emitted during the production of meat compared to the same amount of vegetables? a) About 3 times as much b) About 10 times as much c) **About 30 times as much** d) About 100 times as much e) I don't know. *(Schächtele & Hertle, 2007)*	0.94	0.43

A 1-dimensional Rasch analysis of all items resulted in a scale with a person separation reliability of R_p = .85. Item mean square infit values were between .79 and 1.17 and thus all below the recommended threshold of 1.20 for samples between 500 and 1,000 participants. The model did not fit the data of only seven participants well (1.3%), as indicated by person t infit values above 1.96. A descriptive analysis of the person parameters again showed that the knowledge measure was rather difficult, as indicated by a mean value substantially below zero (M_θ = -1.97, SD = 1.31, range = -5.20 – 1.82).

A separate analysis of *climate system knowledge* (28 items) resulted in a scale with a person separation reliability of R_p = .81. Item mean square infit values were between 0.77 and 1.18. The model did not fit the data of only three participants well (0.6%). The mean value of the person parameters was substantially below zero (M_θ = -2.28, *SD* = 1.42, range = -5.11 – 1.33).

A separate analysis of *climate protective behavioural knowledge* (11 items) resulted in a scale with a person separation reliability of R_p = .64. Item mean square infit values were between 0.84 and 1.03. The model did not fit the data of only four participants well (0.8%). The mean value of the person parameters was substantially below zero (M_θ = -1.27, *SD* = 1.29, range = -3.42 – 3.40).

6.2.4.4 Climate protective behaviour

Information behaviour. The first indicator for climate protective behaviour was information behaviour, which was assessed similarly as in Study 2 (see Pahl & Bauer, 2013). Four climate protection initiatives with opportunities for individual engagement were introduced and participants were asked whether they were interested in further information, resulting in scores for *information amount* from 0 (*none*) to 4 (*all initiatives*; *M* = 1.64, *SD* = 1.48, range = 0 – 4). The initiatives referred to transport (i.e., "Car sharing is a way to reduce $C0_2$ emissions caused by driving. Liftshare is one example for a platform organising shared rides in the UK. Are you interested in further information?"), energy use (i.e., "The Home Energy Check is an online calculator that acts as a quick and simple way to work out how you could reduce your energy use. Are you interested in further information?"), consumption/resource use (i.e., "BBC Goodfood provides a table for seasonal food in the UK. Eating seasonal food contributes to limiting CO_2 emissions. Are you interested in having a look?"), and political/social action (i.e., "The Earth Day Network's mission is to mobilise a worldwide movement to build a healthy, sustainable environment and address climate change. On their website you can support climate change action as a citizen signer. Are you interested in having a look at this website?"). If participants requested further information, they received a corresponding screenshot (see Appendix 5).[23] The amount of time participants spent on the four pages with the screenshots was summed, with a value of 0 assigned for those who did not view a given

[23] 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

page (M = 36 sec, SD = 54, range = 0 – 394 for n = 505 participants[24]). Moreover, those viewing the information were asked whether they could imagine using/participating in the initiatives on a fully labelled scale ranging from 1 (*no*) to 5 (*yes*). They could also indicate that they already used/participated in the initiative (Liftshare: n = 7 already used it; n = 126 evaluated it, M = 3.88, SD = 1.06; Home Energy Check: n = 12 had already used it; n = 261 evaluated it, M = 4.29, SD = 0.80; food table: n = 13 already used it, n = 242 evaluated it, M = 4.27, SD = 0.94; Earth Day Network, n = 1 had already signed, n = 169 evaluated it, M = 4.10, SD = 0.95). These values indicate that, overall, the provided information was not well-known and of interest for the participants who viewed it.

Budget allocation. A budget allocation task by Spence et al. (2014) was adapted as a second indicator for climate protective behaviour. Hence, this measure assessed hypothetical behaviour. All items were newly developed. Participants were asked to imagine they were part of a local council that decides how their community distributes funding to local initiatives. They had to allocate £100,000 to 5 local initiatives they believed to be most important. Out of a list of 20 initiatives that had applied for funding, they were instructed to select five different initiatives they would like to support and allocate the amount of funding they would like to provide each of them. The proposed initiatives were displayed in random order. Five were related to climate protection: Extension of local cycling routes to promote the use of bikes (transport; supported by n = 174; mean allocated budget was M = £6,341, SD = 10,782); financial support for renewable energy sources on houses to reduce CO_2 emissions (energy use; supported by n = 254; mean allocated budget was M = £12,576 , SD = 16,532); support for a local organic gardening and farming initiative to reduce environmental impact (consumption/resource use; supported by n = 195; mean allocated budget was M = £7,165, SD = 12,113); establishing a local climate change council to advise on policy measures (political action; supported by n = 114, mean allocated budget was M = £3,688, SD = 8,315); flood defence measures to reduce infrastructure damage (flooding was one of the main consequences of climate change reported in the news text; supported by n = 217; mean allocated budget was £M = 10,843, SD = 15,074). The 15 alternative initiatives referred to social, cultural, health, infrastructure, or security issues. They were constructed with the aim of providing reasonably attractive initiatives (see Table 16). The *number of climate-related initiatives*

[24] The values for three participants (i.e., 1848, 5203, and 50377 sec) were excluded as they exceeded a reasonable amount of time for viewing the amount of information given and thus were probably caused by interruptions in answering the questionnaire.

supported, which ranged from 0 (*none*) to 5 (*all initiatives*; *M* = 1.88, *SD* = 1.24, range = 0 – 5) as well as the amount of *budget allocated to these initiatives* (*M* = £40,613, *SD* = 30.019, range = 0 – 100,000) served as variables for further analyses.[25]

Table 16. Measure of budget allocation in Study 3

Instruction:
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.

Items were displayed in random order.
Bold face in online survey as displayed here.

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

[25] For the analysis of the allocated budgets, I coded missing values as 0. I had to exclude *n* = 11 participants due to implausible values. The implausible values emerged for the following reason: As I assumed this task would be rather challenging for some participants, I programmed a limit of £100,000 for the sum of money allocated to the five selected initiatives. If the amounts participants entered was below or exceeded this total sum of £100,000, they received a notification and 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. I excluded *n* = 11 participants whose allocated sum exceeded £100,000 for further analyses as this sum was beyond the available budget in the hypothetical scenario. I kept *n* = 39 participants whose allocated sum was below £100,000 as this sum simply did not exhaust the available maximum budget and hence was still within a realistic range for the hypothetical scenario.

Climate protective behavioural intention. Alongside the measures of actual and hypothetical behaviour, participants were asked how often they intend to perform 24 actions, six each for transport, energy use, resource use/consumption, and political/social action, respectively (see Table 17). The items were drawn from different versions of the GEB scale (see e.g., Kaiser & Wilson, 2000) but formulated as intended actions instead of past or current actions. Behaviours that impact CO_2 emissions and that can be performed regularly rather than just once (e.g., installing solar panels) were selected. Some of the actions were specifically mentioned in the stimulus news text. They were presented in random order within the four domains.

Participants provided answers on a fully labelled 7-point scale ranging from 0 (*never*) to 6 (*always*). In order to analyse the scale with a Rasch model analogously to the GEB measure, items were dichotomised 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 (see Kaiser & Wilson, 2004, p. 1538). As was done in the GEB scale, the answer option *cannot answer* was provided in case certain actions were not applicable to participants' living situation (e.g., questions on driving behaviour if they do not have a driver's license). Hence, missing values were deliberately allowed, as these can be handled by Rasch models if a sufficient number of answers remain for estimation. Nevertheless, 10 people had to be excluded from the analysis due to missing values on too many variables, which made it impossible to calculate person estimates.

Kaiser and Wilson (2004) recommend that subdimensions of the GEB scale include at least nine items and showed that a 1-dimensional model neither reduces the explanatory value due to a substantial overlap between dimensions nor compromises fit statistics compared to a multi-dimensional model. Therefore, I followed their suggestion and conducted a 1-dimensional analysis. The separation reliability for the 24-item scale was R_p = .72. 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. The model did not fit the data of 45 participants well (9.0%), as indicated by person t infit values above 1.96. This exceeds the recommended threshold of 5%, but is still within a reasonable limit. A descriptive analysis of the person parameters showed that items were well selected with regard to difficulty for this sample, as indicated by a mean value of the person parameters close to zero (M_θ = -0.19, SD = 1.00, range -4.16 – 3.80).

Table 17. Measure of climate protective behavioural intentions in Study 3

Instruction:
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	Infit	δ
1. *Walk, ride a bicycle or take public transport for short journeys (less than 5 km)*	1.02	-0.47
2. *Use a car for travel in nearby areas (up to 30 km) (-)*	1.17	0.92
3. Drive economically (e.g. braking/ accelerating gently)	1.02	-1.17
4. Car share with somebody else	0.95	1.28
5. *Fly within the UK (-)*	1.09	-2.15
6. *Use an aeroplane for longer journeys (more than 600 km) (-)*	1.23	-0.70
Energy use	**Infit**	**δ**
7. Use a clothes dryer (-)	1.17	-0.44
8. Put on layers of clothes rather than use electric/gas heating	0.91	-1.17
9. Have showers that last over ten minutes (-)	1.08	-1.15
10. Fill the kettle fully every time I use it over the amount I actually need (-)	1.11	-1.20
11. *Leave appliances on standby instead of switching them off (e.g., computer, TV) (-)*	1.08	-0.23
12. *Disconnect phones or other devices when finished charging*	0.97	-1.70
Consumption/resource use	**Infit**	**δ**
13. *Buy seasonal food (e.g., fruit and vegetables)*	0.90	-1.23
14. *Eat vegetarian options rather than having meat*	0.97	0.83
15. Buy alternative products because they have less packaging than others on offer	0.82	0.07
16. Share appliances with others instead of buying new ones (e.g., electric appliances)	0.92	1.13
17. Re-use or repair items instead of throwing them away	0.84	-0.64
18. Recycle waste as much as possible	0.78	-2.44
Political/social actions	**Infit**	**δ**
19. *Discuss with someone why their behaviour might be climate damaging*	0.75	1.75
20. Speak to someone in authority (e.g. MP/ employer/ hall warden/ student union) about climate change issues	0.84	2.22
21. Contribute financially to a climate change campaign or organisation	0.85	2.24
22. Take the time to learn more about climate friendly practices (e.g., in books, magazines, Internet)	0.79	1.07
23. Boycott products of companies that demonstrably behave in a manner that damages the climate	0.78	1.09
24. *Take part in a campaign or protest about climate change related issues*	0.81	2.07

6.2.4.5 Situational global identity

In order to assess situational global identity salience, participants were asked how they "think and feel right now, in the current moment" with respect to 10 statements adapted from McFarland et al. (2012) and Reese et al. (2015) on a fully labelled scale from 1 (*not at all*) to 7 (*completely*). Five items covered the *global self-definition* dimension: "I feel close to people all over the world"; "I think of people all over the world as 'we'"; "I feel like I have a lot in common with people all over the world"; "I feel as if people all over the world are one community"; "I identify with people all over the world" (M = 3.21, SD = 1.53, range = 1.00 – 7.00). Five items covered the *global self-investment* dimension: "I empathise with people all over the world when bad things happen"; "I feel like I care about people all over the world"; "I feel the need to be a responsible citizen of the world"; "I feel loyal towards people all over the world"; "I want to help people all over the world" (M = 3.96, SD = 1.51, range = 1.00 – 7.00). Just as with the trait measure, the average of global self-definition was lower than the average of global self-investment.

The CFA of the 2-dimensional model yielded satisfactory model fit with the exception of RMSEA, which exceeded the recommended limit of .08, $\chi^2(34) = 168.14$, $p < .001$; CFI = .95 (robust CFI = .96); TLI = .94; RMSEA = .088, 90% CI [.078, .098] (robust RMSEA = .118, 90% CI [.100, .136]); SRMR = .040. Factor loadings were .85, .88, .91, .88, and .93 for global self-definition, and .77, .90, .86, .92, .95 for global self-investment. The covariance between the dimensions was .86. Cronbach's alphas were α = .95 and .95, omegas ω = .95 and .95, and AVE = .79 and .78, respectively. Hence, all psychometric properties were satisfactory.

6.2.4.6 Global connectedness

In addition, participants were asked to indicate on a fully labelled scale from 1 (*strongly disagree*) to 7 (*strongly agree*) to what extent they disagree or agree with five statements aimed at capturing a feeling of global connectedness ("At one level of thinking, all humans are the same"; "All humans share a common bond"; "On some level, all human life is interconnected"; "What a person does could affect someone in other parts of the world"; "People around the world are more similar than different"; M = 5.02, SD = 1.22, range = 1.00 – 7.00). The difference to the global identity measure was that it was formulated on a general level instead of referring to how participants themselves identified. The measure was adapted from items used by Krämer et al. (2017) as well as Der-Karabetian et al. (2014). It was included as Krämer et al. (2017) found an effect of the video used in this study on a similar measure, which they called universal orientation. Their measure was adapted slightly in order to avoid the spiritual nature of some item wordings. One person was excluded from the analysis due to missing values.

The CFA of the 1-dimensional model yielded satisfactory model fit, $\chi^2(5) = 15.41$, $p = .009$; CFI = .98; TLI = .96 (robust TLI = .97); RMSEA = .064, 90% CI [.042, .087] (robust RMSEA = .102, 90% CI [.047, .163]), SRMR = .023. Factor loadings were .84, .85, .84, .66, and .86, Cronbach's $\alpha = .91$, $\omega = .91$, AVE = .67. Hence, all psychometric properties were satisfactory.

6.2.4.7 Construal level

As an extension to Study 2, a measure of construal level was developed and included. It was based on the measure of *Response Category Width* by Krüger, Fiedler, Koch, and Alves (2014, Study 5). Here, "participants are presented with stimulus objects and estimate the upper and lower boundary of a quantitative attribute of each object" (p. 504). The idea is that an abstract construal of the object implies a broad category width, while a concrete construal implies a narrow category width. Participants are instructed to indicate their estimation by moving two sliders on a scale with labelled endpoints, one for the lower and one for the upper boundary of their estimation. The final slider positions are coded by the computer program on a scale from 1 (*lowest possible value*) to 101 (*highest possible value*). Following Krüger et al. (2014), I obtained category width scores by subtracting the value of the minimum slider from the value of the maximum slider, resulting in values from 0 (*both sliders at the identical position*) to 100 (*the minimum and maximum sliders are positioned at the lower and upper ends of the scale)*.[26]

Four items from the original 10-item scale assessed *general construal level* as an indicator of the general abstractness of participants' current mindset. Participants were asked for intuitive and spontaneous guesses regarding the following estimation problems: "How many emails are sent every day (including spam, advertising, etc.)? 4 billion – 400 billion"; "How many peanuts make an average 500 g jar of peanut butter? 100 peanuts – 3,000 peanuts"; "How many feathers does an eagle have? 100 feathers – 8,000 feathers"; "How many coffee beans do you need to make one pound of coffee? 150

[26] Some participants only moved one of the two sliders and therefore had missing values regarding the lower or upper boundary of their estimation. I recoded these missing values as the default minimum (=1) or maximum (=101) values of the sliders, respectively, as they represent the position in which the participants left them. Following Krüger et al. (2014), I transformed negative intervals into positive scores if participants mixed up the two sliders.

coffee beans – 3,000 coffee beans” (M = 41.0, SD = 20.8, range = 0 – 100). Moreover, four climate change-related estimation problems were developed to assess *climate-related construal level*: “How many people worldwide will experience flooding next year?”; “How many people worldwide will die from heat-related cardiovascular diseases next year?”; “How many people worldwide will be affected by water supply deficits within the next 20 years?”; “How many people worldwide will have to leave their home due to changing climatic circumstances within the next 20 years?” The scale endpoints were all labelled with “0 people” and “8 billion people” (M = 43.8, SD = 24.2, range = 0 – 100).

The CFA of the 2-dimensional model yielded satisfactory model fit, $\chi^2(19) = 50.69$, $p < .001$; CFI = .98; TLI = .97; RMSEA = .057, 90% CI [.041, .074] (robust RMSEA = .066, 90% CI [.044, .088]); SRMR = .028. Factor loadings were .58, .77, .76, and .81 for general construal level, and .84, .88, .83, and .89 for climate-related construal level. The covariance between the dimensions was .57. Cronbach’s α = .82 and .92, ω = .82 and .92, AVE = .54 and .75, respectively. Hence, all psychometric properties were satisfactory.

6.2.4.8 Contact with the climate change issue in the media

Similarly to the measures used by Taddicken (2013) and Trepte et al. (2017), participants rated how often in the past they were confronted with reports about climate change in eleven media outlets (see Table 18) on a fully labelled ordinal scale ranging from 1 (*never*) to 6 (*several times a week*). The wording “confronted with” was used in order to include not only active but also passive information consumption. However, when analysing the data, I noted that a substantial number of participants did not answer the questions (see Table 18, last column). Maybe they thought that providing no answer indicated that they did not use a specific medium. However, as an explicit answer option “never” was also available, the results are difficult to interpret. I also suspected that reduced motivation as the end of the questionnaire drew nearer might have played a role and thus refrained from using these data.

Table 18. Contact with the climate change issue in the media in Study 3

		1 *Never*	*2* *Once in half a year or less*	*3* *Several times in half a year*	*4* *Once a month*	*5* *Several times a month*	*6* *Several times a week*	
	Md [a]	*n*	*n*	*n*	*n*	*n*	*n*	MV
BBC channels	4	38 (7%)	44 (9%)	135 (27%)	76 (15%)	101 (20%)	77 (15%)	37 (7%)
Terrestrial/ free to air TV channels (e.g., ITV, Channel 4, excluding BBC)	3	54 (11%)	45 (9%)	138 (27%)	71 (14%)	79 (16%)	63 (12%)	58 (11%)
Subscription TV channels (e.g., Sky/ Virgin Media)	3	80 (16%)	34 (7%)	65 (13%)	46 (9%)	41 (8%)	49 (10%)	193 (38%)
Radio	3	85 (17%)	55 (11%)	94 (19%)	61 (12%)	53 (10%)	48 (9%)	112 (22%)
Printed newspapers	4	43 (8%)	41 (8%)	78 (15%)	67 (13%)	77 (15%)	38 (7%)	164 (32%)
Brochures (e.g., of climate change organisations)	2	89 (18%)	46 (9%)	44 (9%)	36 (7%)	22 (4%)	14 (3%)	257 (51%)
Academic journals	2	90 (18%)	28 (6%)	45 (9%)	29 (6%)	19 (4%)	15 (3%)	282 (56%)
Online newspapers (e.g., www.theguardian.com)	3	75 (15%)	32 (6%)	54 (11%)	54 (11%)	53 (10%)	28 (6%)	212 (42%)
Online social media (e.g., Facebook)	3	97 (19%)	51 (10%)	51 (10%)	39 (8%)	51 (10%)	51 (10%)	168 (33%)
Online video-sharing websites (e.g., YouTube)	2	117 (23%)	51 (10%)	36 (7%)	42 (8%)	42 (8%)	36 (7%)	184 (36%)
Online discussion platforms (e.g., forums)	2	100 (20%)	35 (7%)	37 (7%)	35 (7%)	31 (6%)	17 (3%)	253 (50%)

Note. MV = missing values. [a] I report the median instead of the arithmetic mean because the answer format of the scale was ordinal.

6.2.4.9 Manipulation checks and control questions

Video manipulation. As a first manipulation check, based on the study by Kirsner (2011), participants were asked how the video made them feel and how they would describe the video to a friend. I coded answers reflecting a *feeling of connectedness* (i.e., connected, part of, together, world community, friendship, similarity, bonding, cooperation) with 0 (*absent*) or 1 (*present*). Second, based on the studies by Kitzmann (2015) and Pavey, Greitemeyer, and Sparks (2011), an item on connectedness was embedded within some distractor questions. Participants were asked about the extent of their disagreement or agreement with the following statements on a fully labelled scale from 1 (*strongly disagree*) to 7 (*strongly agree*): "The video reminded me of times… when I had felt close and connected to others" (manipulation check, M = 3.96; SD = 1.65, range 1 – 7); "when I had felt competent"; "when I had felt free and autonomous"; "when I had felt happy"; "when I had felt relaxed and calm" (distractor questions).

Text manipulation. In order to assess the *perceived communicated distance* of climate change in the news text as a manipulation check, the items used in Study 2 were translated into English. Participants answered two questions for each distance dimension on a 7-point semantic differential: "How does the journalist portray the topic climate change in the article? It is mainly about… the present – the future"; "present events – future events" (perceived communicated temporal distance, M = 4.42, SD = 1.29, range = 1.00 – 7.00, r_S = .52); "close locations – far locations"; "events close by – events far away" (perceived communicated spatial distance, M = 4.36, SD = 1.38, range = 1.00 – 7.00, r_S = .66); "people like me – other people"; "events affecting myself – events affecting others" (perceived communicated social distance, M = 4.03, SD = 1.33, range 1.00 – 7.00, r_S = .48); "certain facts – uncertain opinions"; "likely events – unlikely events" (perceived communicated hypothetical distance, M = 3.34, SD = 1.42, range = 1.00 – 7.00, r_S = .69).

Control questions. Some control items that should not differ between the experimental news text conditions were asked. Positioned alongside the relevance scale regarding the news text, participants indicated whether "the article is … unreliable – reliable" (M = 5.23, SD = 1.47, range = 1 – 7) and "difficult to understand – easy to understand" (M = 5.39, SD = 1.39, range = 1 – 7). Positioned alongside the communicated distance scale, they indicated whether "the journalist portrays climate change as … harmless – dangerous", "weak – strong" (perceived communicated severity; M = 5.53, SD = 1.21, range = 1.00 –

7.00, $r_S = .76$) as well as “unimportant – important” (perceived communicated relevance; $M = 5.80$, $SD = 1.21$, range = 1 – 7).

Moreover, two items on instrumentality were included as people might experience lower instrumentality when the text is about a distant location and distant people (see Spence et al., 2011): “I can personally help to reduce climate change by changing my behaviour”; ”I personally feel that I can make a difference with regard to climate change” ($M = 4.71$, $SD = 1.47$, range = 1.00 – 7.00, $r_S = .79$). Finally, environmental concern was assessed in order to check whether the video manipulation might have an effect on it. The control video with fish might raise environmental concern, while the Matt video is intended to raise concern about humans. It read: “How concerned, if at all, are you about the environment?” On a scale from 1 (*not at all*) to 7 (*completely,* $M = 4.66$, $SD = 1.46$, range = 1 – 7).

6.3 Results

6.3.1 Relations of study variables

Table 19 displays zero-order correlations between the study variables.

Table 19. Zero-order correlations between the variables of Study 3

Variable	1	2	3	4	5a	5b	5c	5d	6	7a	7b	8a
1. Psychological socio-spatial distance of climate change [a]												
2. Relevance attributed to news text [a]	-.20*											
3. Climate system knowledge [b]	-.21*	.26*										
4. Climate protective behavioural knowledge [b]	-.15*	.25*	.60*									
5. Climate protective behaviour												
5a. Information amount	.02	.28*	.03	.10*								
5b. Information time	.05	.31*	.14*	.15*	.62*							
5c. No. supported climate initiatives	-.28*	.35*	.26*	.28*	.17*	.25*						
5d. Budget allocated to climate initiatives	-.10*	.16*	.20*	.15*	.07	.12*	.58*					
6. Climate protective behavioural intentions [b]	-.16*	.31*	.19*	.24*	.19*	.21*	.21*	.15*				
7. Salient global identity												
7a. Salient global self-definition [a]	-.07	.28*	.02	-.01	.30*	.12*	.08	.06	.22*			
7b. Salient global self-investment [a]	-.14*	.40*	.09*	.06	.30*	.16*	.13*	.05	.29*	.89*		
8. Construal level												
8a. General construal level [a]	.07	-.08	-.24*	-.19*	-.07	-.19*	-.13*	-.03	-.17*	-.05	-.06	
8b. Climate construal level [a]	.05	-.13*	-.06	-.05	-.09*	-.15*	-.10*	-.03	-.15*	.02	-.00	.63*

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.

6.3.2 Randomisation and manipulation checks

Randomisation. The five experimental groups did not differ in terms of age ($F(1,506)$ = 0.58, p = .445), gender ($\chi^2(4)$ = 4.25, p = .374), education ($\chi^2(36)$ = 34.14, p = .557), working status ($\chi^2(28)$ = 26.08, p = .569), considering the UK their home ($\chi^2(4)$ = 10.5, p = .902), and planning to live in the UK in the future ($\chi^2(4)$ = 2.36, p = .670). Hence, randomisation can be regarded as successful.

Video manipulation. Participants reported remembering times when they had felt close and connected to others while watching the video more when they had received the connectedness 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). Twenty participants in the connectedness condition mentioned the coded words related to connectedness, compared to one participant in the control condition. Environmental concern did not differ between conditions, indicating that the fish video (control condition) did not unintentionally raise such considerations ($t(398)$ = 0.69, p = .491, d = 0.07).

Text manipulation. I conducted a MANOVA in order to examine the four indicators of perceived communicated distance in the news text on climate change (i.e., social, spatial, temporal, hypothetical) in the two experimental groups receiving the proximity text compared to the two experimental groups receiving the distance text (i.e., main effect of the text condition factor in a two-factorial MANOVA also including the video condition factor). Two participants had to be excluded due to missing data. The multivariate Shapiro-Wilk tests were significant in three of the four conditions. Hence, multivariate normality cannot be assumed (W^* = 0.98, p = .004 in the connectedness + proximity condition; W^* = 0.98, p = .144 in the control + proximity condition; W^* = 0.98, p = .008 in the connectedness + distance condition; W^* = 0.97, p = .001 in the control + distance condition). However, as outlined in Chapter 3.3.5, robust methods for factorial MANOVA do not exist yet. The assumption of homogeneity of covariance matrices can be ignored in my case because group sizes are almost equal (see Field et al., 2012, p. 733). Using Pillai's trace, there was a significant effect of text condition on the outcomes (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 distance between the distance conditions (M = 4.41, SD = 1.26) and proximity conditions (M = 4.41, SD = 1.32, F(1,394) = 0.00, p = .994) and no difference in perceived communicated hypothetical distance between the distance conditions (M = 3.46, SD = 1.39) and proximity conditions (M = 3.23, SD = 1.44, F(1,394) = 2.56, p = .110). Thus, the intended specific manipulation of communicated socio-spatial distance was perceived by participants.

I conducted a second MANOVA for the control variables which should not differ between conditions (perceived communicated severity, communicated relevance, reliability, comprehensibility, instrumentality). One participant had to be excluded due to missing data. The multivariate Shapiro-Wilk tests were significant in all four conditions. Hence, multivariate normality cannot be assumed (W^* = 0.95, p < .001 in the connectedness + proximity condition; W^* = 0.94, p < .001 in the control + proximity condition; W^* = 0.96, p < .001 in the connectedness + distance condition; W^* = 0.95, p < .001 in the control + distance condition). Using Pillai's trace, there was no significant effect of text condition (p = .735) or video condition (p = .571), and no interaction effect on the outcomes (p = .799). Hence, the text manipulation did not unintendedly affect the assessed control variables.

6.3.3 Main research questions and hypotheses

I calculated an unmoderated and a moderated path model to examine all main research questions and hypotheses. The models included participants in the experimental conditions answering all variables and thus a sample of n = 383.[27] Text condition was coded as 0 (*communication of socio-spatial distance in the news text*) or 1 (*communication of socio-spatial proximity in the news text*) in order to investigate whether proximising as a communication strategy had effects on the assessed outcomes. Video condition was coded as 0 (*control*) or 1 (*connectedness*) in order to examine whether the approach to increasing the salience of a global identity had effects on the assessed outcomes. To

[27] The models do not include the control condition receiving no stimuli as this is not directly addressed by the research questions regarding the effect of the proximising strategy (i.e., communicating proximity vs. distance). Moreover, in the control condition, the mediator, relevance attribution to the news text, was not assessed. The control group is analysed in Chapter 6.3.4.5 in order to determine baseline levels of the dependent variables in comparison to the experimental groups. The analyses were repeated with a subsample excluding participants who had indicated that they had not seen the whole video. The pattern of results was equivalent. However, the interaction assumed in H3.9 did not reach statistical significance, probably due to reduced test power (p = .097).

reduce model complexity and idiosyncratic influences of the variables, which is particularly useful for moderated models (see Chapter 0), I used 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 system knowledge, climate protective behavioural knowledge, and climate protective behavioural intentions. The allocated budget variable was divided by 1,000 because *R* could not run the model with such large numbers.

Unmoderated model including video condition as predictor. In order to test H3.1 to H3.7, I calculated an unmoderated path model. The model fit the data well, $\chi^2(1) = 1.42$, $p = .234$; CFI = 1.00; TLI = .98; RMSEA = .033, 90% CI [.000, .145]; SRMR = .008. It explained 8.8% of the variance in psychological socio-spatial distance of climate change, 4.8% of the variance in relevance attributed to the news text on climate change, 9.2% of the variance in the amount of information viewed on climate protective engagement options, 10.3% of the variance in the time devoted to this information, 19.4% of the variance in the number of supported climate initiatives, 15.0% of the variance in the budget allocated to them, 11.4% of the variance in climate protective behavioural intentions, 9.4% of the variance in climate system knowledge, and 8.0% of the variance in climate protective behavioural knowledge. Figure 19 shows the standardised results.

H3.1 hypothesised that the communication of socio-spatial proximity vs. distance of climate change in a news text reduces recipients' *psychological socio-spatial distance of climate change*. This assumption was confirmed ($B = -0.77$, $SE = 0.13$, 95% CI [-1.01, -0.54], $p < .001$, $\beta = -.30$).

H3.2 hypothesised that the communication of socio-spatial proximity vs. distance of climate change in a news text positively predicts the *relevance attributed to the news text about the climate change issue* indirectly through lower psychological socio-spatial distance of climate change. This assumption was confirmed (indirect relation, $B = 0.15$, $SE = 0.05$, 95% CI [0.06, 0.25], $p = .001$, $\beta = .06$; no direct relation, $p = .549$, $\beta = .03$; no significant total relation, $p = .074$, $\beta = .09$).

H3.3 hypothesised that communication of socio-spatial proximity vs. distance of climate change in a news text positively predicts *climate protective behaviour* indirectly through lower psychological socio-spatial distance of climate change and higher relevance attributed to the news text about the climate change issue (serial indirect relation). This assumption was confirmed. Proximising climate change indirectly and positively predicted the four indicators of climate protective behaviour: amount of information viewed on climate protective engagement options (indirect relation, $B = 0.05$, $SE = 0.02$, 95% CI [0.02, 0.09], $p = .003$, $\beta = .02$; no direct relation, $p = .540$, $\beta = .03$; no total relation including the direct path as well as the three indirect paths through 1) psychological socio-spatial distance, 2) relevance attribution, and 3) both sequentially, $p = .569$, $\beta = .03$), time spent viewing this information (indirect relation, $B = 1.86$, $SE = 0.63$, 95% CI [0.77, 3.21], $p = .003$, $\beta = .02$; no direct relation, $p = .307$, $\beta = .06$; no total relation, $p = .096$, $\beta = .08$), number of climate-related initiatives supported in the budget allocation task (indirect relation, $B = 0.04$, $SE = 0.01$, 95% CI [0.02, 0.07], $p = .002$, $\beta = .02$; no direct relation, $p = .116$, $\beta = -.08$; no total relation, $p = .549$, $\beta = .03$), amount of budget allocated to these (indirect relation, $B = 0.97$, $SE = 0.34$, 95% CI [0.34, 1.69], $p = .004$, $\beta = .02$; no direct relation, $p = .279$, $\beta = -.05$; no total relation, $p = .428$, $\beta = .04$). Moreover, proximising climate change indirectly predicted climate protective behavioural intentions (indirect relation, $B = 0.03$, $SE = 0.01$, 95% CI [0.01, 0.06], $p = .006$, $\beta = .02$; no direct relation, $p = .698$, $\beta = .02$; no total relation, $p = .142$, $\beta = .07$).

Examining further indirect and direct relations showed that proximising climate change positively predicted the number of supported climate initiatives (indirect relation, $B = 0.19$, $SE = 0.05$, 95% CI [0.10, 0.30], $p < .001$, $\beta = .08$) and allocated budget (indirect relation, $B = 4.20$, $SE = 1.20$, 95% CI [2.16, 6.75], $p < .001$, $\beta = .07$) through lower psychological socio-spatial distance. Moreover, psychological socio-spatial distance was directly and negatively related to these two indicators ($B = -0.24$, $SE = 0.05$, 95% CI [-0.34, -0.15], $p < .001$, $\beta = -.23$, and $B = -5.42$, $SE = 1.24$, 95% CI [-7.88, -3.04], $p < .001$, $\beta = -.23$, respectively). Relevance attributed to the news text was directly and positively related to the amount of information viewed on climate protective engagement options ($B = 0.35$, $SE = 0.05$, 95% CI [0.25, 0.44], $p < .001$, $\beta = .30$), time spent viewing this information ($B = 12.35$, $SE = 1.77$, 95% CI [8.92, 15.91], $p < .001$, $\beta = .30$), number of supported climate initiatives ($B = 0.30$, $SE = 0.04$, 95% CI [0.22, 0.39], $p < .001$, $\beta = .32$), allocated budget ($B = 6.47$, $SE = 1.24$, 95% CI [3.85, 8.88], $p < .001$, $\beta = .27$), and behavioural intentions ($B = 0.23$, $SE = 0.04$, 95% CI [0.15, 0.31], $p < .001$, $\beta = .29$).

H3.4 hypothesised that the communication of socio-spatial proximity vs. distance of climate change in a news text positively predicts *climate change knowledge* in the form of climate system knowledge and climate protective behavioural knowledge indirectly through higher psychological socio-spatial distance of climate change and lower relevance attributed to the news text about the climate change issue (serial indirect relation). This assumption was confirmed. Proximising climate change indirectly and positively predicted climate system knowledge (indirect relation, $B = 0.04$, $SE = 0.01$, 95% CI [0.02, 0.07], $p = .006$, $\beta = .01$; no direct relation, $p = .520$, $\beta = -.03$; no total relation, $p = .497$, $\beta = .03$) and climate protective behavioural knowledge (indirect relation, $B = 0.03$, $SE = 0.01$, 95% CI [0.01, 0.06], $p = .005$, $\beta = .01$; no direct relation, $p = .301$, $\beta = .05$; total relation, $B = 0.27$, $SE = 0.13$, 95% CI [0.02, 0.53], $p = .040$, $\beta = .10$).

Examining further indirect and direct relations showed that proximising also positively predicted climate system knowledge through lower psychological socio-spatial distance (indirect relation, $B = 0.13$, $SE = 0.05$, 95% CI [0.05, 0.23], $p = .004$, $\beta = .05$). Moreover, psychological socio-spatial distance was directly and negatively related to climate system knowledge ($B = -0.17$, $SE = 0.05$, 95% CI [-0.28, -0.06], $p = .001$, $\beta = -.16$). Relevance attributed to the news text was directly and positively related to climate system knowledge ($B = 0.27$, $SE = 0.06$, 95% CI [0.16, 0.39], $p < .001$, $\beta = .24$) and climate protective behavioural knowledge ($B = 0.23$, $SE = 0.05$, 95% CI [0.14, 0.34], $p < .001$, $\beta = .23$).

H3.5 hypothesised that climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge is positively related to climate protective behaviour. As the path model contains the residual covariances only, I additionally calculated bivariate correlations to test this hypothesis. System knowledge was not related to the amount of information viewed on climate protective engagement options ($p = .171$). However, it was positively related to the time spent viewing information on these engagement options ($r_P = .19$, $p < .001$; $B = 8.27$, $SE = 3.07$, $p = .007$, $\psi = .12$), the number of supported climate initiatives ($r_P = .26$, $p < .001$; $B = 0.22$, $SE = 0.07$, $p = .003$, $\psi = .15$), the amount of budget allocated to these initiatives ($r_P = .31$, $p < .001$; $B = 8.06$, $SE = 1.93$, $p < .001$, $\psi = .21$), and climate protective behavioural intentions ($r_P = .18$, $p < .001$; $B = 0.11$, $SE = 0.07$, $p = .133$, $\psi = .09$). Behavioural knowledge was also not related to the amount of information viewed on climate protective engagement options ($p = .052$). However, it was positively related to the time spent viewing information on these engagement options ($r_P = .18$, $p < .001$; $B = 6.21$, $SE = 2.80$, $p = .026$, $\psi = .10$), the number of supported climate initiatives ($r_P = .28$, $p < .001$; $B = 0.26$, $SE = 0.07$, $p < .001$, $\psi = .19$), the amount of allocated budget ($r_P = .29$, $p < .001$; $B = 7.46$, $SE = 1.80$, $p < .001$, $\psi =$

.21), and climate protective behavioural intentions (r_P = .22, p < .001; B = 0.16, SE = 0.06, p = .003, ψ = .14).

RQ3.1 asked whether the relation with climate protective behaviour is different for climate system knowledge compared to climate protective behavioural knowledge. However, the effect sizes of the relations between climate protective behaviour and system knowledge did not differ from the relations with behavioural knowledge ($ts(381)_{\text{difference}} \leq 1.05$, ps > .05; see Field et al., 2012, p. 239).

H3.7 hypothesised that 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 increases a) the relevance attributed to the news text, b) climate protective behaviour, and c) climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge. H3.7a was not confirmed, as the video condition (connectedness vs. control) did not directly influence relevance attribution (p = .221, β = .06). In order to test H3.7b and H3.7c, I examined the total relations, including both the direct effects and the indirect paths through relevance attribution. H3.7b and H3.7c were not confirmed, as there were no significant total relations between video condition and the four indicators of climate protective behaviour, behavioural intentions, climate system knowledge, and climate protective behavioural knowledge (ps ≥ .102, βs ≤ .08). All direct and indirect paths were not significant (ps ≥ .179, βs ≤ .06).

Moderated model including video condition as predictor and moderator. In order to test H3.9, I included the interaction between psychological socio-spatial distance and video condition (connectedness vs. control) in the model. This changes the interpretation of the relation between psychological socio-spatial distance and relevance attribution to a conditional relation (i.e., relation 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., effect for people with an average psychological socio-spatial distance).

The model fit the data well, $\chi^2(10)$ = 14.04, p = .171; CFI = 1.00; TLI = .98; RMSEA = .032, 90% CI [.000, .068] (robust RMSEA = .033, 90%CI [.000, .071]; SRMR = .025. It explained 3.8% of the variance in psychological socio-spatial distance of climate change, 5.8% of the variance in relevance attributed to the news text on climate change, 9.2% of the variance in the amount of information viewed on climate protective engagement options, 10.2% of the variance in the time devoted to this information, 19.4% of the variance in the number of supported climate initiatives, 14.9% of the variance in the budget allocated to them, 11.2% of the variance in climate protective behavioural intentions, 9.4% of the variance in climate system knowledge, and 7.8% of the variance in climate protective behavioural knowledge. Figure 20 shows the standardised results.

H3.9 hypothesised that the relation between the psychological socio-spatial distance of climate change and the relevance attributed to a news text about the climate change issue will be moderated by global identity salience. More specifically, the negative relation between psychological socio-spatial distance and relevance attribution will be weaker if participants' global identity as a human is made salient through the video communicating connectedness between people all over the world. This assumption was confirmed, as there was a significant interaction between psychological socio-spatial distance and the video condition in predicting relevance attribution (B = 0.20, SE = 0.10, 95% CI [-0.01, 0.42], p = .046, β = .14, although the bootstrapped confidence interval included 0). I decomposed the interaction by including an inverse dummy for video condition. This showed that while people who had received the control video 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, -0.16], p < .001, β = -.29), there was no such relation among people who had received the video communicating connectedness between people all over the world (p = .293, β = -.09). Moreover, the indirect relation between proximising climate change and relevance attribution through psychological socio-spatial distance as well as the serial indirect relations with the behavioural and knowledge outcomes through psychological socio-spatial distance and relevance attribution were not significant for people who had received the connectedness video (ps ≥ .295).

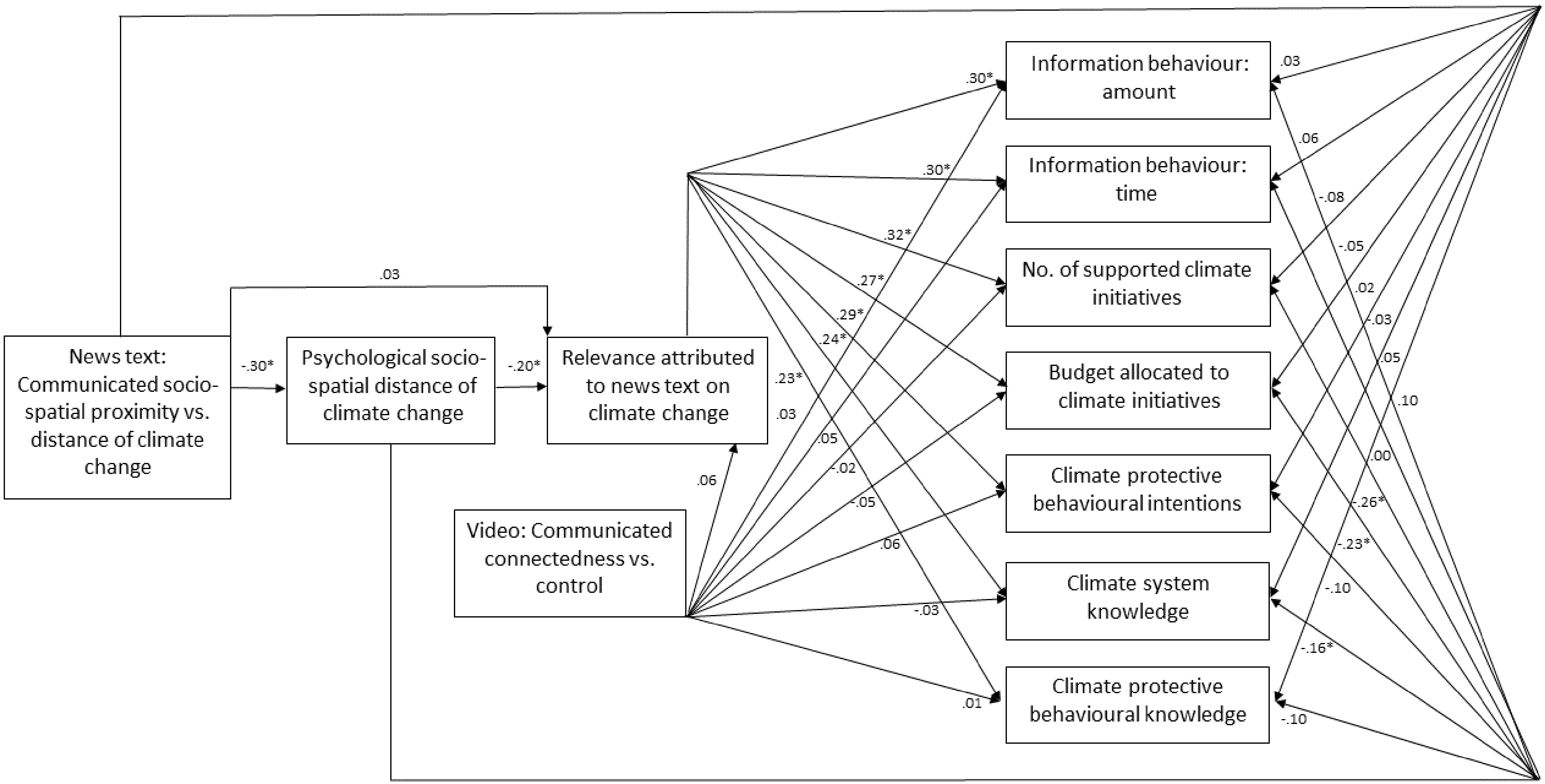


Figure 19. Unmoderated path model in Study 3 including the predictor video condition (connectedness vs. control).

Note. Standardised coefficients are displayed. * $p < .05$. Residual covariances between the behavioural and knowledge outcomes are not displayed to reduce complexity.

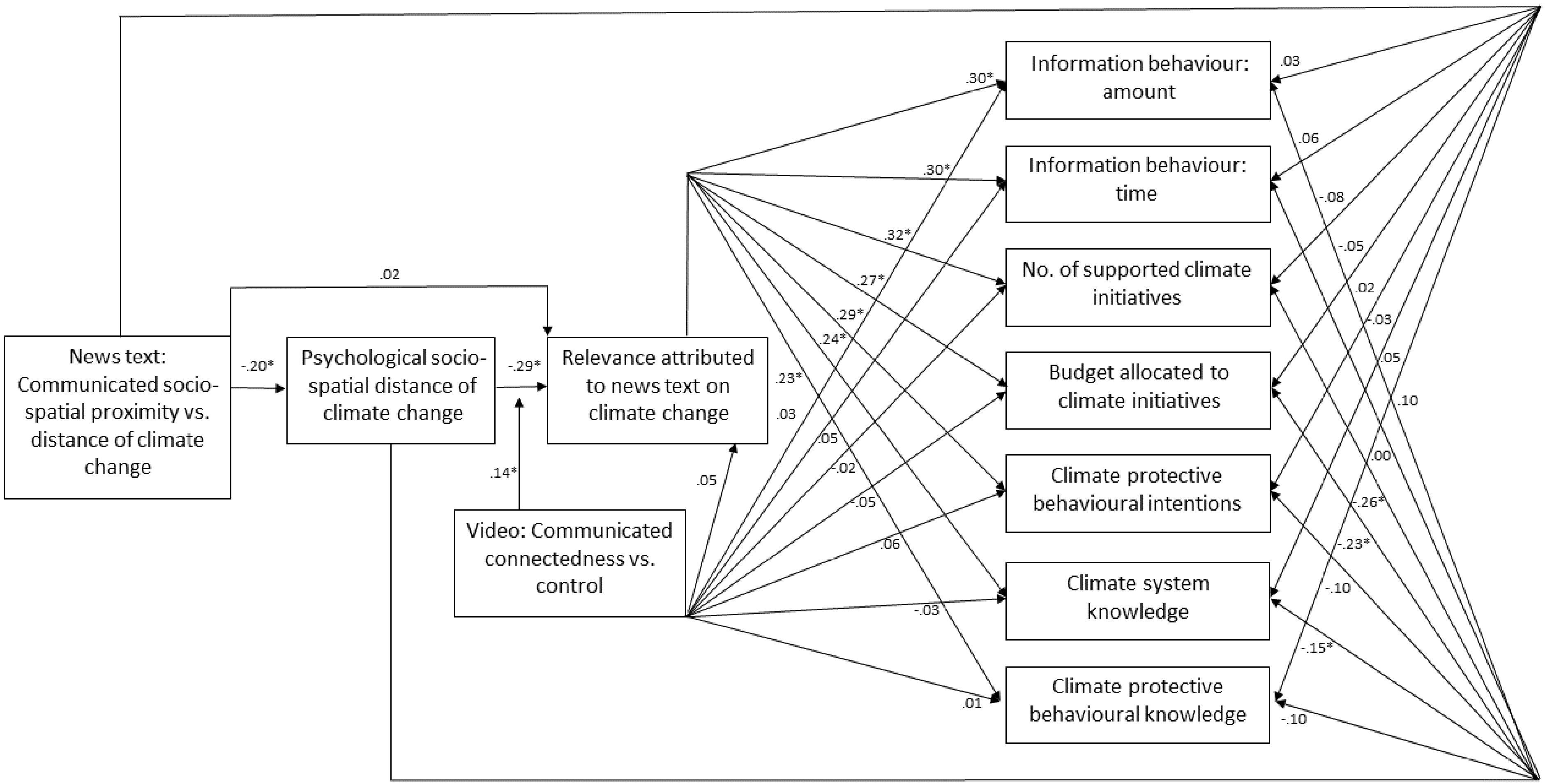


Figure 20. Moderated path model in Study 3 including the moderator video condition (connectedness vs. control).

Note. Standardised coefficients are displayed. * p < .05. Residual covariances between the behavioural and knowledge outcomes are not displayed to reduce complexity.

6.3.4 Additional research questions and analyses

6.3.4.1 Effect of video condition on measure of global identity salience

RQ3.2 asked whether making global identity salient (i.e., through the video communicating connectedness between people around the world) before receiving the news text on climate change increases the explicit measure of global identity salience developed for this study. In an SEM for the 2-dimensional model, video condition did not impact the subdimensions of global self-definition (p = .306, β = .05) or global self-investment (p = .275, β = .06). The study additionally included a measure on global connectedness, as Krämer et al. (2016) had found an effect of the connectedness video on a similar measure. Therefore, I also conducted an SEM for this variable. However, video condition did not influence global connectedness either (p = .827, β = -.01).

6.3.4.2 Construal level

RQ3.3 asked whether the newly developed measure of construal level (general and climate change-related) is related to the psychological distance of climate change as a 4-dimensional construct. In a corresponding SEM, psychological distance did not predict general construal level (p = .149, β = -.08) or climate change-related construal level (p = .851, β = -.01).

RQ3.4 asked whether communication of socio-spatial proximity vs. distance of climate change in a news text influences recipients' construal level (general and climate change-related). In a corresponding SEM, I found that the text condition did not influence general construal level (p = .186, β = .07) or climate change-related construal level (p = .699, β = -.02).

6.3.4.3 Path models including the measure of global identity salience

As additional analyses, I calculated the path models with the measure of global identity salience (i.e., the global self-definition and global self-investment dimensions, respectively) instead of the video condition as potential predictors and moderators (similarly as in Study 2).

Unmoderated model including salient global self-definition. The model fit the data satisfactorily, $\chi^2(1)$ = 1.82, p = .177; CFI = 1.00; TLI = .95; RMSEA = .046, 90% CI [.000, .140] (robust RMSEA = .052, 90% CI [.000, .173]); SRMR = .011. It explained 8.8% of the variance in psychological socio-spatial distance of climate change, 11.5% of the variance in relevance attributed to the news text on climate change, 15.8% of the variance in the amount of information viewed on climate protective engagement options, 10.3% of the variance in the time devoted to this information, 19.2% of the variance in the number of supported climate initiatives, 14.9% of the variance in the budget allocated to these, 13.4% of the variance in climate protective behavioural intentions, 9.7% of the variance in climate system knowledge, and 8.4% of the variance in climate protective behavioural knowledge. Figure 21 shows the standardised results.

Salient global self-definition directly and positively predicted the relevance attributed to the news text about climate change (B = 0.28, SE = 0.05, 95% CI [0.18, 0.37], p < .001, β = .28). Moreover, I examined the total relations with the behavioural and knowledge outcomes, including both the direct paths and the indirect paths through relevance attribution. Overall, salient global self-definition positively predicted the amount of information viewed on climate protective engagement options (total relation, B = 0.37, SE = 0.06, 95% CI [0.26, 0.49], p < .001, β = .33; direct relation, B = 0.30, SE = 0.06, 95% CI [0.18, 0.42], p < .001, β = .26; indirect relation, B = 0.07, SE = 0.02, 95% CI [0.04, 0.11], p < .001, β = .06), the time devoted to this information (total relation, B = 6.02, SE = 1.96, 95% CI [2.12, 10.08], p = .002, β = .15; no direct relation, p = .188, β = .07; indirect relation, B = 3.23, SE = 0.76, 95% CI [1.82, 4.97], p < .001, β = .08), and climate protective behavioural intentions (total relation, B = 0.19, SE = 0.04, 95% CI [0.11, 0.27], p < .001, β = .25; direct relation, B = 0.14, SE = 0.04, 95% CI [0.06, 0.22], p = .001, β = .18; indirect relation, B = 0.05, SE = 0.01, 95% CI [0.03, 0.08], p < .001, β = .07).

Furthermore, it indirectly and positively predicted through higher relevance attribution the number of supported climate initiatives (indirect relation, B = 0.09, SE = 0.02, 95% CI [0.05, 0.13], p < .001, β = .09; no direct relation, p = .530, β = -.03; no total relation, p = .242, β = .06), the budget allocated to these (indirect relation, B = 1.86, SE = 0.47, 95% CI [1.02, 2.85], p < .001, β = .08; no direct relation, p = .351, β = -.05; no total relation, p = .532, β = .03), climate system knowledge (indirect relation, B = 0.08, SE = 0.02, 95% CI [0.04, 0.13], p < .001, β = .07; no direct relation, p = .216, β = -.06; no total relation, p = .887, β = .01), and climate protective behavioural knowledge (indirect relation, B = 0.07, SE = 0.02, 95% CI [0.04, 0.11], p < .001, β = .07; no direct relation, p = .159, β = -.07; no total relation, p = .983, β = .00).

Moderated model including salient global self-definition. I included the interaction between psychological socio-spatial distance and salient global self-definition in the model. The model fit the data satisfactorily except for TLI, $\chi^2(10) = 27.74$, $p = .002$; CFI = .98; TLI = . 88 (robust TLI = .89); RMSEA = .068, 90% CI [.039, .098] (robust RMSEA = .070, 90% CI [.040, .102]); SRMR = .029. It explained 8.8% of the variance in psychological socio-spatial distance of climate change, 11.8% of the variance in relevance attributed to the news text on climate change, 16.0% of the variance in the amount of information viewed on climate protective engagement options, 10.4% of the variance in the time devoted to this information, 19.3% of the variance in the number of supported climate initiatives, 14.9% of the variance in the budget allocated to these, 13.6% of the variance in climate protective behavioural intentions, 9.7% of the variance in climate system knowledge, and 8.4% of the variance in climate protective behavioural knowledge.

There was no significant interaction between psychological socio-spatial distance and salient global self-definition in predicting relevance attribution to the news text about climate change ($p = .724$, $\beta = -.02$). The model parameters did not change. Therefore, I included the interaction in Figure 21.

Unmoderated model including salient global self-investment. The model did not fit the data satisfactorily in terms of TLI and RMSEA, $\chi^2(1) = 7.57$, $p = .006$; CFI = 0.99; TLI = .65 (robust TLI = .64); RMSEA = .131, 90% CI [.062, .215] (robust RMSEA = .145, 90% CI [.062, .215]; SRMR = .023. It explained 8.8% of the variance in psychological socio-spatial distance of climate change 18.6% of the variance in relevance attributed to the news text on climate change, 14.7% of the variance in the amount of information viewed on climate protective engagement options, 10.3% of the variance in the time devoted to this information, 18.8% of the variance in the number of supported climate initiatives, 14.8% of the variance in the budget allocated to these, 14.4% of the variance in climate protective behavioural intentions, 9.1% of the variance in climate system knowledge, and 8.0% of the variance in climate protective behavioural knowledge. Figure 22 shows the standardised results.

Salient global self-investment directly and positively predicted the relevance attributed to the news text about climate change ($B = 0.40$, $SE = 0.05$, 95% CI [0.30, 0.50], $p < .001$, $\beta = .30$). Moreover, I examined the total relations with the behavioural and knowledge outcomes, including both the direct paths and the indirect paths through relevance attribution. Overall, salient global self-investment positively predicted the amount of information viewed on climate protective engagement options (total relation, $B = 0.37$, $SE = 0.06$, 95% CI [0.26, 0.49], $p < .001$, $\beta = .32$; direct relation, $B = 0.28$, $SE = 0.06$, 95% CI [0.15, 0.41], $p < .001$, $\beta = .24$; indirect relation, $B = 0.09$, $SE = 0.02$, 95% CI [0.05, 0.15], $p < .001$, $\beta = .08$), the time devoted to this information (total relation, $B = 7.58$, $SE = 1.92$, 95% CI [4.00, 11.41], $p < .001$, $\beta = .19$; no direct relation, $p = .147$, $\beta = .08$; indirect relation, $B = 4.48$, $SE = 0.96$, 95% CI [2.79, 6.72], $p < .001$, $\beta = .11$), and climate protective behavioural intentions (total relation, $B = 0.25$, $SE = 0.04$, 95% CI [0.17, 0.32], $p < .001$, $\beta = .31$; direct relation, $B = 0.18$, $SE = 0.04$, 95% CI [0.11, 0.27], $p < .001$, $\beta = .23$; indirect relation, $B = 0.06$, $SE = 0.02$, 95% CI [0.03, 0.10], $p < .001$, $\beta = .08$).

Furthermore, it indirectly and positively predicted through higher relevance attribution the number of supported climate initiatives (indirect relation, $B = 0.13$, $SE = 0.02$, 95% CI [0.08, 0.18], $p < .001$, $\beta = .11$; no direct relation, $p = .464$, $\beta = -.03$; no total relation, $p = .967$, $\beta = .09$), the budget allocated to these (indirect relation, $B = 2.79$, $SE = 0.62$, 95% CI [1.69. 4.10], $p < .001$, $\beta = .12$; no direct relation, $p = .220$, $\beta = -.05$; no total relation, $p = .298$, $\beta = .05$), climate system knowledge (indirect relation, $B = 0.11$, $SE = 0.03$, 95% CI [0.06, 0.18], $p < .001$, $\beta = .10$; no direct relation, $p = .511$, $\beta = -.04$; no total relation, $p = .212$, $\beta = .06$), and climate protective behavioural knowledge (indirect relation, $B = 0.10$, $SE = 0.02$, 95% CI [0.06, 0.15], $p < .001$, $\beta = .10$; no direct relation, $p = .349$, $\beta = -.05$; no total relation, $p = .349$, $\beta = .05$).

Moderated model including salient global self-investment. The model fit the data well, $\chi^2(10) = 23.77$, $p = .008$; CFI = .99; TLI = .91 (robust TLI = .92); RMSEA = .060, 90% CI [.029, .091] (robust RMSEA = .061, 90% CI [.029, .093]); SRMR = .028. It explained 8.7% of the variance in psychological socio-spatial distance of climate change, 19.0% of the variance in relevance attributed to the news text on climate change, 14.8% of the variance in the amount of information viewed on climate protective engagement options, 10.4% of the variance in the time spent viewing this information, 18.8% of the variance in the number of supported climate initiatives, 14.8% of the variance in the budget allocated to these, 14.6% of the variance in climate protective behavioural intentions, 9.2% of the variance in climate system knowledge, and 8.0% of the variance in climate protective behavioural knowledge.

There was no significant interaction between psychological socio-spatial distance and salient global self-definition in predicting relevance attribution to the news text about climate change ($p = .734$, $\beta = -.02$). The model parameters did not change. Therefore, I included the interaction in Figure 22.

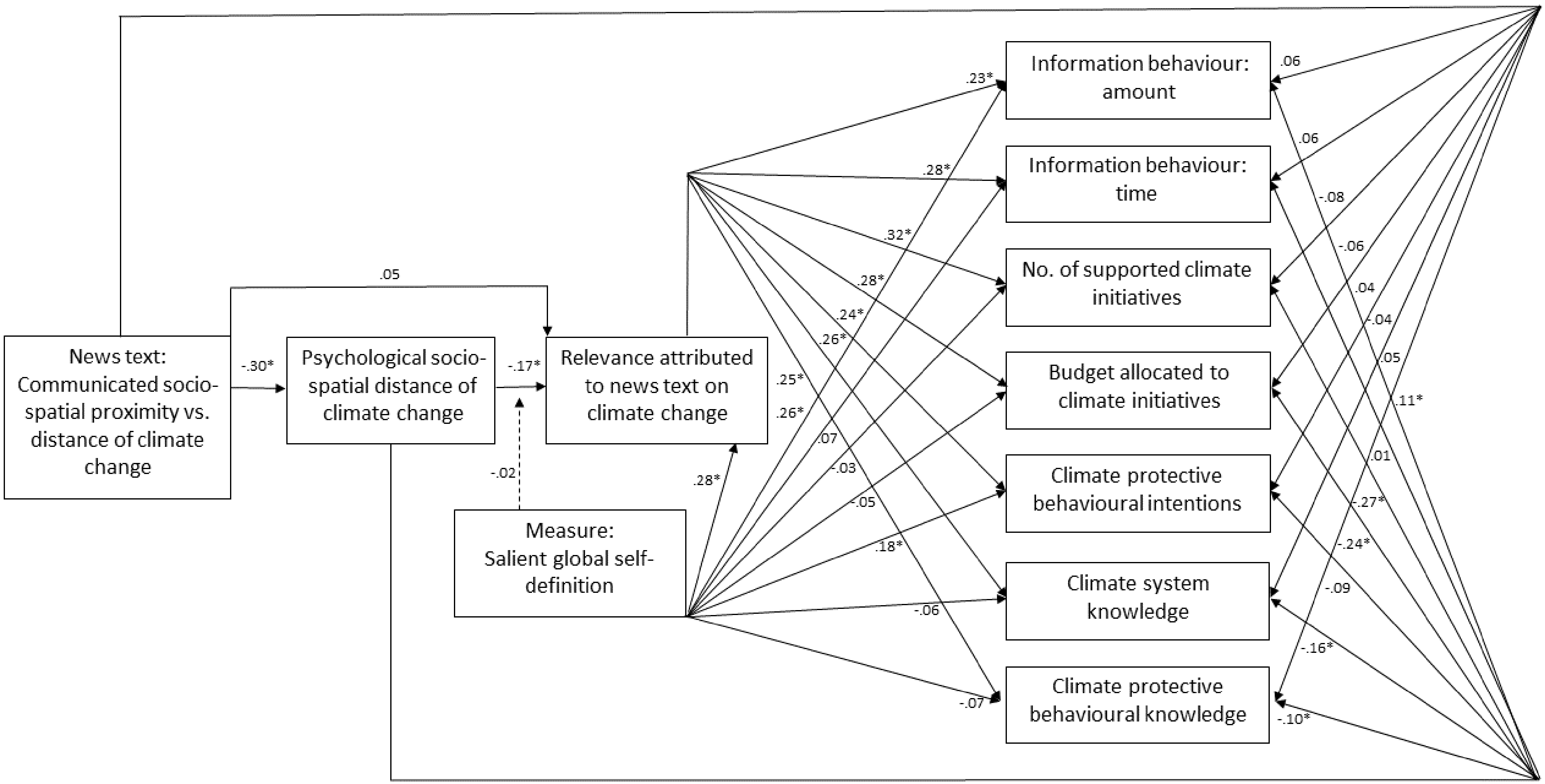


Figure 21. Path model in Study 3 including the self-definition dimension of global identity salience.

Note. Standardised coefficients are displayed. * p < .05. Coefficients did not change when including the interaction between psychological socio-spatial distance and salient global self-definition (dashed line). Residual covariances between the behavioural and knowledge outcomes are not displayed to reduce complexity.

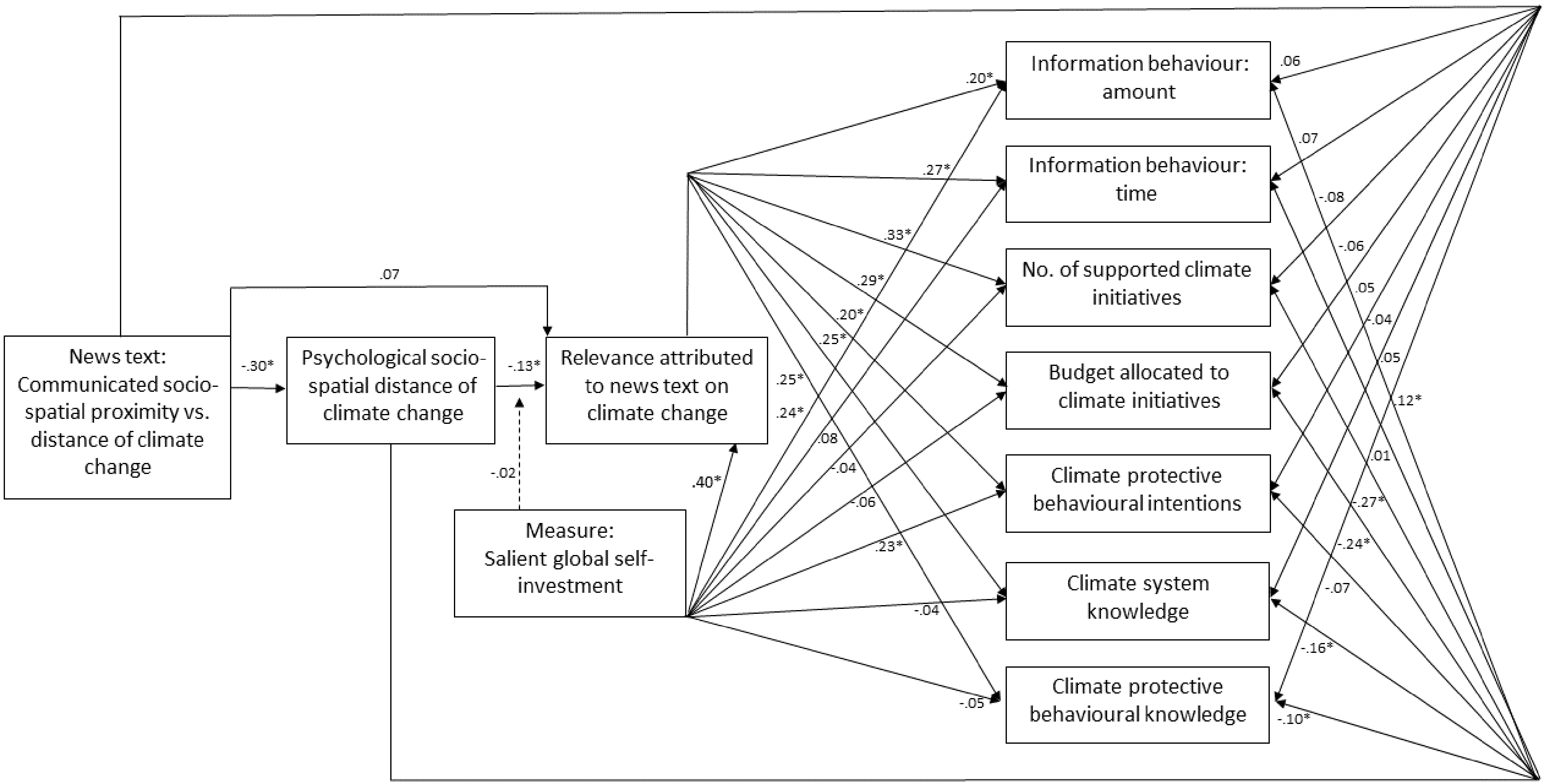


Figure 22. Path model in Study 3 including the self-investment dimension of global identity salience.

Note. Standardised coefficients are displayed. * p < .05. Coefficients did not change when including the interaction between psychological socio-spatial distance and salient global self-investment (dashed line). Residual covariances between the behavioural and knowledge outcomes are not displayed to reduce complexity.

6.3.4.4 Video condition and psychological socio-spatial distance

As a further additional path analysis, I examined whether the video condition aimed at increasing the salience of global identity interacted with the text condition communicating proximity vs. distance in order to see whether there is a moderation effect one step earlier in the model. The model fit the data well, $\chi^2(9) = 2.75$, $p = .973$; CFI = 1.00; TLI = 1.03; RMSEA = .000, 90% CI [.000, .000]; SRMR = .006. There was no conditional effect of the video condition (i.e., in the distance text condition, coded as 0) on psychological socio-spatial distance ($p = .845$, $\beta = -.01$) and no interaction between the video condition and the text condition of communicating the proximity vs. distance of climate change in predicting psychological socio-spatial distance ($p = .137$, $\beta = .12$).

6.3.4.5 Impact of exposure to the news text on climate change

In order to compare the experimental conditions with the control condition and hence examine effects of news exposure on the climate-related outcomes, I conducted a MANOVA with condition as the independent variable and psychological socio-spatial distance, the four indicators of climate protective behaviour, climate protective behavioural intentions, climate system and climate protective behavioural knowledge, and climate-related construal level as dependent variables (relevance attributed to the text was not assessed in the control condition). I used the factor and Rasch scores. Using Pillai's trace, there was a significant effect of condition on the outcomes, $V = 0.04$, $F(9,475) = 2.12$, $p = .026$.

Follow-up univariate ANOVAs revealed significant effects of condition on climate protective behavioural intentions ($F(1,483) = 6.47$, $p = .011$, $\omega^2 = .01$) and climate protective behavioural knowledge ($F(1,483) = 9.76$, $p = .002$, $\omega^2 = .02$). However, planned contrasts with Bonferroni adjusted p-values accounting for multiple group comparisons (Field et al., 2012, p. 447) did not result in significant group differences regarding behavioural intentions between the five groups ($ps_{\text{Bonferroni}} \geq .380$). Behavioural knowledge was higher in the connectedness + proximity condition ($M = -0.98$, $SD = 1.31$, $t(195) = 3.50$, $p_{\text{Bonferroni}} = .008$, $d = 0.50$) and the control + proximity condition ($M = -1.01$, $SD = 1.43$, $t(196) = 3.17$, $p_{\text{Bonferroni}} = .014$, $d = 0.45$) compared to the control condition ($M = -1.60$, $SD = 1.14$). There was no difference between the control condition and the connectedness + distance condition and the control + distance condition ($ps_{\text{Bonferroni}} \geq .510$). Table 20 provides an overview. It is worth mentioning that the direct effect of communicating proximity vs. distance in the news text I found in the path analysis is apparently too small to be detected in this analysis, which accounts for the full design of the study.

Table 20. Dependent variables in the five experimental conditions of Study 3

	Connectedness + proximity condition	Connectedness + distance condition	Control + proximity condition	Control + distance condition	Control condition	
Variable	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*F*
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
Climate system knowledge [b]	-2.13 (1.53)	-2.28 (1-48)	-2.12 (1.45)	-2.16 (1.24)	-2.49 (1.27)	1.66
Climate protective behavioural knowledge [b]	-0.98 (1.31)	-1.24 (1.30)	-1.01 (1.43)	-1.28 (1.17)	-1.60 (1.14)	9.76*
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
b. Information time (sec)	45 (56)	32 (46)	34 (62)	29 (41)	44 (65)	0.02
c. Number of 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
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
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(*)
Climate-related construal level [a]	3.21 (21.63)	-4.29 (20.94)	-2.44 (19.87)	-0.62 (20.71)	1.61 (22.70)	0.00

Note. [a] Factor scores. [b] Rasch scores. * $p < .05$. (*) planned contrasts with Bonferroni correction did not reveal significant group differences.

6.4 Discussion

Just like for Studies 1 and 2, in this section, I will discuss Study 3 with respect to its main results as well as limitations and some first general implications for future research. A discussion integrating all three studies and a more detailed outline of suggestions for follow-up studies is provided in Chapter 7.

6.4.1 Summary of results

6.4.1.1 Main research questions

In this study, I examined the assumed process behind a possible effect of proximising climate change on public engagement in a stepwise manner. First, I examined the hypothesis that communicating the socio-spatial proximity of climate change in a news text by focussing on locally expected consequences reduces recipients' *psychological socio-spatial distance of climate change*. This assumption was confirmed, as proximising climate change decreased UK residents' psychological socio-spatial distance of climate change (i.e., participants who read about consequences in the UK were less likely to believe climate change would mostly affect other people in geographically distant locations compared to participants who read about consequences in Bangladesh; H3.1).

Second, I examined the hypothesis that communicating the socio-spatial proximity vs. distance of climate change in a news text positively predicts the *relevance attributed to the news text about the climate change issue* indirectly through lower psychological socio-spatial distance of climate change. This assumption was confirmed, as proximising climate change indeed indirectly and positively predicted relevance attribution through lower psychological socio-spatial distance (H3.2).

Third, I examined the hypothesis that communicating the socio-spatial proximity vs. distance of climate change in a news text positively predicts *climate protective behaviour* indirectly through lower psychological socio-spatial distance of climate change and higher relevance attributed to the news text about the climate change issue (serial indirect relation). This assumption was confirmed, as proximising climate change indeed indirectly and positively predicted the four indicators of climate protective behaviour (i.e., amount of information viewed on climate protective engagement options, time devoted to this information, number of climate-related initiatives supported in a budget allocation task, amount of budget allocated to these) and climate protective behavioural intentions through lower psychological socio-spatial distance of climate change and higher relevance attributed to the news text (H3.3).

Fourth, I examined the hypothesis that communicating the socio-spatial proximity vs. distance of climate change in a news text positively predicts *climate change knowledge* in the form of climate system knowledge and climate protective behavioural knowledge indirectly through lower psychological socio-spatial distance of climate change and higher relevance attributed to the news text about the climate change issue (serial indirect relation). This assumption was confirmed, as proximising climate change indeed indirectly and positively predicted climate system knowledge and climate protective behavioural knowledge through lower psychological socio-spatial distance of climate change and higher relevance attributed to the news text (H3.4).

Hence, this study's evidence suggests that proximising climate change might be a communicative means to reduce the psychological socio-spatial distance of climate change and thus in turn increase the perceived relevance of the issue among recipients. Moreover, it might motivate climate protective behaviour and climate change knowledge by reducing the distance and increasing the relevance of the issue. These results speak in favour of the usefulness of proximising climate change in strategic communication.

However, only the effect of proximising on psychological socio-spatial distance can be interpreted as a causal effect, as only the communication of proximity vs. distance (i.e., the first step of the modelled process) was experimentally varied. Moreover, the effect sizes of the indirect relations were very small. Even though the small indirect relations were significant, I found no significant total relations between proximising climate change and the behavioural outcomes and climate system knowledge, only climate protective behavioural knowledge (including direct and indirect paths; direct paths were also not significant). This 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 the standard error of the indirect relation. In order not to exploit this circumstance and avoid erroneous theoretical conclusions, they argue that "there must be theoretical support for the inclusion of a mediator in the planning stages of the study. The inclusion of mediators must be theory-driven, and not data-driven" (p. 438). This was the case in my research, which used path modelling to test pre-defined hypotheses (instead of adjusting paths post-hoc).

Fifth, I examined the hypothesis that climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge is positively related to climate protective behaviour. This assumption was predominantly confirmed, as both forms of knowledge were positively related to three of the four indicators of climate protective behaviour (i.e., time devoted to information on climate protective engagement options, number of climate-related initiatives supported in a budget allocation task, amount of budget allocated to these) and behavioural intentions (H3.5). The sizes of the relations did not differ for climate system knowledge compared to climate protective behavioural knowledge (RQ3.1).

On the one hand, knowledge might be a precondition for climate protective behaviour. However, behavioural knowledge does not seem to be more important. On the other hand, an inclination to behave in a climate friendly way might precede motivation to gain knowledge, or the two might mutually impact each other. The present research cannot entangle these possibilities.

Next, I examined the predicting and moderating role of the video communicating connectedness between people around the world, which aimed to increase the salience of recipients' global identity. I examined the hypothesis that the video increases a) the relevance attributed to a news text about the climate change issue, b) climate protective behaviour, and c) climate change knowledge in the form of climate system knowledge and climate protective behavioural knowledge. These assumptions were not confirmed (H3.7).

However, I found the expected interaction between psychological socio-spatial distance and the video condition in predicting relevance attribution. While participants who had seen the control video (underwater world with fish) evaluated the news text on climate change as less relevant the more they perceived that climate change mostly affects other people in far-off locations, there was no such relation for participants who had received the video communicating connectedness between people all over the world (H3.9). Moreover, communicated proximity vs. distance in the news text did not indirectly predict climate protective behaviour and climate change knowledge for them.

This result suggests that communicating a feeling of connectedness might 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. Hence, while reducing distance by proximising climate change might be one communicative approach, bridging the distance by increasing feelings of connectedness could complement this strategy.

6.4.1.2 Additional research questions

The video communicating connectedness between people around the world did not impact the explicit measure of global identity salience, which was included at the end of the study (RQ3.2). This measure asked participants about their global self-definition and self-investment in the current moment.

As an additional analysis, I investigated these two dimensions of the global identity salience measure as predictors and moderators instead of the video condition. The pattern of results was identical for the global self-definition dimension and the global self-investment dimension. The analysis revealed that the more participants expressed a salient global self-definition and self-investment, the more relevance they attributed to the provided news text on climate change. Furthermore, salient global self-definition and self-investment positively predicted the amount of information viewed on climate protective engagement options, the time devoted to this information, and climate protective behavioural intentions (total relations). Moreover, salient global self-definition and self-investment indirectly and positively predicted the number of supported climate initiatives, the budget allocated to these, climate system knowledge, and climate protective behavioural knowledge through higher relevance attribution. As mentioned above, mediator models can be more powerful than the test of the total relation, including both direct and indirect paths, in large samples with small coefficients (O'Rourke & MacKinnon, 2015). As I had not theoretically specified a hypothesis on the indirect relations a priori, these results have to be treated with caution, even though the indirect path through relevance attribution makes theoretical sense. There was no significant interaction between psychological socio-spatial distance and salient global self-definition or self-investment in predicting relevance attribution to the news text about climate change. Hence, salient global identity, as assessed by the explicit measure, did not bridge the psychological socio-spatial distance of climate change.

A causal mechanism cannot be clearly inferred from this correlational evidence. On the one hand, increasing the salience of global identity might lead recipients to consider climate change as more relevant and behave in a more climate friendly way. On the other hand, increasing the relevance of climate change and promoting climate protective actions might foster identification with all humanity, or there might be unconsidered third variables causing both.

I further examined the newly developed measure of construal level (general and climate change-related). It was not related to the 4-dimensional measure of psychological distance of climate change (RQ3.3). This contradicts one of the main assumptions of CLT (Liberman

& Trope, 2008); however, it has to be kept in mind that the new measure needs further validation before firm conclusions can be drawn. Moreover, the measure of construal level was not influenced by whether participants had received the news text communicating climate change as proximal or the news text communicating climate change as distant (RQ3.8).

Finally, in an additional analysis, I compared participants who had received climate change communication (i.e., the groups who received the news text communicating climate change as proximal and the groups who received the news text communicating climate change as distant) with the control group that did not receive any stimuli in order to examine the baseline effect of media exposure to the topic. Receiving the news text did not influence psychological socio-spatial distance of climate change, climate protective behaviour, climate-related construal level, and climate system knowledge. However, climate protective behavioural knowledge was higher in the two groups receiving the news text which communicated climate change as proximal compared to the control condition (i.e., regardless of the video condition). Thus, the results of this study indicate that a news text communicating climate change consequences as affecting recipients' local area can be an effective means of conveying climate protective behavioural knowledge.

6.4.2 Limitations and implications for future research

A first limitation of Study 3 refers to the stimulus aimed at raising the salience of global identity among recipients. The video of people all over the world dancing together did not affect the explicit measure of situational global identity. Both operationalisations, the video and the measure, were based on similar prior research but new in their concrete application. First, this could imply 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 showing an underwater world with fish.[28] A second explanation for why the video condition did not lead to differences in the measure of situational global identity might be that the measure was positioned at the end of the questionnaire and thus after a rather long delay. This position was deliberately chosen to ensure that participants' reflections on global identity did not impact the news reception situation and responses to the climate change-related questions. However, positioning the situational global identity measure after the salience manipulation in a follow-up study might be insightful. A third explanation could be that the salience manipulation was too subtle and

[28] I could not ask people directly whether the video gave them a feeling of connectedness with people all over the world as this question would not have made sense in the control condition with the video of the underwater world.

implicit to be detected by the explicit measure. Finally, a fourth explanation could be that the measure of "situational" global identity is actually not sensitive to situational variations but still represents a general trait among respondents. The difference to the trait measure used in Study 1 and Study 2 consisted of explicitly asking participants to think about how they felt right now in the current moment rather than asking them about their general self-definition and self-investment. Overall, based on the results of this study, I suggest that new approaches to raising the salience of global identity be attempted and that future research address the validity of the situational global identity measure (see Chapter 7.4.3.2 for some ideas).

The measures regarding climate system knowledge and climate protective behavioural knowledge should be adapted in follow-up studies in two respects. First, the mean values of the person parameters were substantially below zero. This indicated that the scale was difficult for the sample. This means that the Rasch-based instrument cannot differentiate between less knowledgeable people as well as between more knowledgeable people. The lower knowledge compared to Study 2 could be due to the fact that Study 2 was conducted with a student sample, whereas Study 3 was conducted with a sample of the general public. Another explanation could be that the questions were answered more conscientiously in the laboratory compared to the online field setting. Additional items with a moderate to low difficulty should be developed in order to even better differentiate among less knowledgeable participants. Overall, multiple-choice questions are easier than open questions; a true/false answer format could even be used instead of providing multiple answer options. Second, the reliability of the climate protective behavioural knowledge measure could be improved by increasing the number of items, even though its reliability was comparable to the measures it was based on (see Chapter 2.4.5). When constructing the stimulus text, I reasoned that including a lot of behavioural information might compromise the external validity and readability of the news text. Even though the number of items was increased from eight items in Study 2 to 11 items in Study 3, including further behavioural knowledge content could still be a valuable extension in follow-up studies.

In addition to the knowledge measure, the measures of climate protective behaviour also need to be critically discussed. First, it can be questioned whether time spent on the sites displaying information on climate protective engagement options is a meaningful indicator in online field research. In contrast to a laboratory setting, such as in Study 2, interruptions in answering the questionnaire cannot be controlled for. These are erroneously interpreted as strong engagement. In order to address this issue, I excluded extreme outliers in the analysis of this outcome. However, it cannot be fully eliminated. Second, a climate change-related budget allocation task was newly developed for this study. As some participants had to be excluded due to implausible values (see Chapter 6.2.4.4), the allocation procedure might have been too difficult. Even though excluding 11 out of 508 participants (2%) was not a huge loss, I suggest that future researchers conduct qualitative tests of the measure in order to gain insights on difficulties respondents might face while conducting the budget allocation task (e.g., using the think-aloud technique). An alternative explanation for the implausible values might be a loss of motivation, as the measure was positioned rather late in the questionnaire. Third, the Rasch model for the behavioural intention measure did not fit the data of 9% of the sample well, which exceeds the recommended threshold of 5%. More items should be included to improve the scale. The measure was restricted to 24 items in Study 3 with the aim of keeping the burden for participants as low as possible (in contrast to Study 1, where I used a GEB scale with 35 items to assess climate protective behaviour). Kaiser and colleagues usually use between 30 and 50, and up to even 65 items for the GEB scale (see Kaiser & Wilson, 2004). However, I deemed such an extensive measure unsuitable for the present study design, which included several important constructs as well as observable indicators of climate protective behaviour.

In addition to my suggestion to conduct research on the validity of the situational global identity scale, it could also be improved with respect to psychometrics, as fit indices were acceptable but not satisfactory. Developing further items that go beyond the items adapted from the scale by McFarland et al. (2012) could be a worthwhile endeavour. The measures displayed in Table 1 could provide inspiration.

Finally, the study made a first attempt to operationalise climate change-related construal level. This measure should be thoroughly validated in future research. Moreover, alternative approaches could be developed (see Chapter 7.4.4.3 for some ideas).

7. General discussion

The majority of scientists express an urgent need to limit climate change in order to secure sustainable development and the quality of life on Earth. At the same time, they see that our societies are not reacting as quickly and decisively as required to achieve this goal (Maibach et al., 2014). Climate change communication thus aims to motivate public engagement to limit climate change. The central means of this communication are news media (Brüggemann et al., 2018). In my research, I aimed to contribute to understanding how news about climate change can be communicated in order to reach the audience, convey scientific knowledge, and motivate public engagement for climate protection. Specifically, I examined the usefulness of two connected communication strategies. The first strategy consisted of reducing the psychological socio-spatial distance of climate change by means of proximising the issue in news coverage (Brügger et al., 2016). The second strategy consisted of bridging the psychological socio-spatial distance of climate change by raising the salience of people's global identity as someone who is part of the inclusive ingroup of all humanity (McFarland et al., 2012). Moreover, I sought to provide first insights into the role of global identity as an individual trait in the context of climate change communication.

In this chapter, I summarise the main findings of my research (Chapter 7.1) and outline how they contribute to and extend prior research in terms of methodical aspects (Chapter 0). Subsequently, I discuss theoretical implications of my work (Chapter 0) and describe limitations and suggestions for future research (Chapter 7.4). Finally, I infer practical implications (Chapter 7.5).

7.1 Summary of results

While I summarised the results for specific research questions and hypotheses from the individual studies in Chapters 4.4, 5.4, and 6.4, I will now outline my inferred answers to the overall research interests which guided this work. In this section, I compare the evidence from all three studies and combine them in order to draw more general conclusions.

7.1.1 Is proximising climate change a promising communication strategy?

Proximising climate change by focussing on local instead of global or geographically remote consequences has been recommended as a communication strategy to engage the public with respect to climate change (e.g., van der Linden et al., 2015). The reasoning behind this recommendation is that many people seem to perceive climate change as a phenomenon that primarily impacts other people in remote places (i.e., psychological socio-spatial distance).

Proximising climate change might change this perception and bring climate change closer to people. If individuals perceive climate change as affecting the local area and themselves or people living close by, they might evaluate the issue as more relevant, which might in turn predict their engagement with the issue in the form of climate protective behaviour and the acquisition of climate change knowledge. However, the recommendation to proximise climate change in communication still lacked convincing empirical evidence (Brügger et al., 2016; Brügger, Dessai et al., 2015; McDonald et al., 2015). My research aimed at investigating the effects of communicated proximity vs. distance in news coverage on people's psychological socio-spatial distance of climate change, the relevance attributed to corresponding news coverage, climate protective behaviour, and climate change knowledge. Moreover, I sought to examine the implicitly assumed process behind proximising effects, namely a reduction of psychological socio-spatial distance (H1), which might in turn increase issue relevance (H2), which might in turn promote climate protective behaviour (H3) and knowledge about climate change (H4).

Study 1 consisted of an online survey with a quota sample of the German population. Its aim was to examine how perceptions of current news coverage predict public engagement. People were asked to what extent the news communicated climate change as affecting mainly other people in distant locations (i.e., perceived communicated socio-spatial distance in news coverage). The more socio-spatially distant they perceived news communication, the more they themselves evaluated climate change as a phenomenon affecting mainly other people in distant locations (i.e., psychological socio-spatial distance; confirming H1.1). The relation was of medium size. Moreover, the more they perceived news portrayals of climate change as distant, the less personally and societally relevant they found the issue. The size of the total relations was small, though. I did not find the hypothesised indirect negative relation between perceived communicated distance of climate change and personal and societal relevance attributed to the issue through psychological socio-spatial distance (disconfirming H1.2). Perceived communicated socio-spatial distance was not indirectly related through psychological socio-spatial distance and personal or societal relevance attributed to the issue to climate protective behaviour (disconfirming H1.3) or climate system and climate protective behavioural knowledge (disconfirming H1.4). Moreover, there were no direct or total relations. However, I found a small indirect negative relation between perceived communicated socio-spatial distance in news coverage and climate protective behavioural knowledge through psychological socio-spatial distance.

Keeping the correlational nature of the data in mind and thus being cautious about causal statements, these results could nevertheless be interpreted as a first indication that it might be worthwhile to communicate proximity in news by focussing on locally expected consequences of climate change for the targeted audience in order to decrease people's psychological socio-spatial distance of climate change, increase the relevance they attribute to the climate change issue, and motivate knowledge acquisition about climate protective behaviours through this reduced psychological socio-spatial distance. However, an experimental approach varying the communicated distance in news reporting was necessary to examine causal effects of proximising climate change more directly.

In Study 2, a laboratory experiment with a sample of students in Germany, I investigated the causal effects of communicating proximity vs. distance of climate change in a news text. Communicating socio-spatial proximity by focussing on locally expected consequences in Germany (compared to communicating climate change as a distant phenomenon mostly impacting developing countries) did not influence how much participants believed climate change would mostly affect other people in geographically distant locations (i.e., psychological socio-spatial distance; disconfirming H2.1). Moreover, it did not indirectly predict the relevance attributed to the news text through psychological socio-spatial distance (disconfirming H2.2). Proximising climate change did not indirectly, through psychological socio-spatial distance and relevance attribution, predict climate protective behaviour (i.e., amount of information viewed on climate protective engagement options, the time devoted to this information, and donation to a climate protection organisation; disconfirming H2.3) and climate change knowledge (i.e., climate system knowledge and climate protective behavioural knowledge; disconfirming H2.4). However, psychological socio-spatial distance of climate change was directly and negatively related to two of the three indicators of climate protective behaviour. The relations were of medium size.

Hence, these results do not support the supposition inferred from Study 1 that communicating proximity in news by focussing on locally expected consequences of climate change for the targeted audience might be a way to decrease people's psychological socio-spatial distance of climate change, increase the relevance they attribute to the issue, and motivate related knowledge acquisition. Moreover, the results suggest that proximising climate change does not seem to be a promising strategy to motivate climate protective behaviour. However, the finding that psychological socio-spatial distance of climate change was negatively related to two of the three indicators of climate protective behaviour indicates that perceiving the phenomenon as affecting mainly others in distant locations might prevent people from taking some forms of action for climate protection. Therefore, it might be still worthwhile to aim to reduce the psychological socio-spatial distance of climate change through communicative means.

Three differences in study design between Study 1 and Study 2 might have contributed to the differences in the results and inferred implications. First, the measure of perceived communicated socio-spatial distance of climate change in Study 1 refers to news coverage in general, while Study 2 experimentally investigated the impact of exposure to one single news text communicating socio-spatial proximity vs. distance. Second, Study 1 used a sample from the general public, while Study 2 used a student sample. Third, the sample size for Study 2 was smaller and test power was thus not sufficient to detect small effect sizes.

The follow-up online experiment in Study 3 consisted of a larger and more diverse quota sample from the general public in the UK. Here, communicating socio-spatial proximity in a news text on climate change by focussing on locally expected consequences in the UK (compared to Bangladesh) decreased psychological socio-spatial distance of climate change (confirming H3.1). The effect size was small to medium. Moreover, proximising climate change in the news text indirectly and positively predicted the relevance attributed to the news text through lower psychological socio-spatial distance (confirming H3.2). The indirect relation was of small size. Proximising also indirectly and positively predicted all assessed indicators of climate protective behaviour (i.e., amount of information viewed on climate protective engagement options, time devoted to this information, number of climate initiatives supported in a hypothetical budget allocation task, money allocated to these initiatives; confirming H3.3) and climate protective behavioural intentions through lower psychological socio-spatial distance of climate change and higher relevance attributed to the news text. The indirect relations were of very small size. Finally, climate change knowledge (i.e., climate system knowledge and climate protective behavioural knowledge) was indirectly and positively predicted by proximising through lower psychological socio-spatial distance of climate change and higher relevance attributed to the news text (confirming H3.4). The indirect relations were also of very small size.

Overall, the results of this study speak for the usefulness of proximising climate change in strategic communication. The small size of the indirect relations may raise doubts on their practical significance. However, I suggest that the results are relevant in light of the study design, in which people were confronted with proximal communication only once in an experimental setting. In a practical context, proximising can be used as a more extensive communication strategy. Stronger effects might be found if people repeatedly receive local information. Moreover, the results shed light on the process behind proximising climate change, which has rarely been investigated before. It is important to note that the described mechanism was not examined as a causal chain in a strict sense, because only the first variable (i.e., communicated socio-spatial proximity vs. distance) was experimentally varied. Therefore, I speak of indirect relations instead of indirect effects or mediation (Kline, 2016, p. 135).

In addition to test power, differences between the results of the two experiments could be rooted in the different populations the samples were recruited from. A comparison of the mean values of psychological socio-spatial distance shows that it was about half a scale point lower in the German student sample of Study 2 (M = 3.44 for social distance, M = 3.50 for spatial distance) compared to the UK sample from the general public in Study 3 (M = 4.07 for social distance, M = 3.83 for spatial distance). Hence, reducing psychological distance by communicating proximity might have been easier in Study 3 compared to Study 2 due to a higher baseline level (however, because baseline levels before media reception were not assessed, this remains a supposition). In both studies, psychological socio-spatial distance did not differ between the control group receiving no stimulus and the experimental groups receiving the news text (both the proximity condition and distance condition). This finding further corroborates the supposition that it might not be easy to greatly change psychological socio-spatial distance through communicative appeals, at least not in an experimental setting involving exposure to one news text.

Summarising the results of the three conducted studies, my research provides some support to the recommendation to proximise climate change in communication by focussing on locally expected consequences. However, it has to be kept in mind that effects seem to be small. Critics have raised concerns that proximising may have adverse effects, for example, by inducing the feeling of an overwhelming threat (Brügger, Dessai et al., 2015). I did not focus on such adverse effects or include feelings of fear or other possible underlying mechanisms in my research. However, I found no negative impacts on the assessed outcomes. Therefore, I conclude that even though strong positive effects on public engagement seem improbable, proximising climate change in communication does not seem to be contraindicated. Moreover, stronger effects might be found if people repeatedly receive information about local consequences. I thus suggest that it is worthwhile to complement communication about the global dimension of climate change with reports about regionally expected consequences. At the same time, I think that the global dimension and consequences for other people in remote places, which might be more severe than local consequences for communication recipients, do not need to be neglected in communicating the issue. I even regard it as a positive sign that global challenges might not need to be broken down to national or regional issues in order to raise people's interest. Raising public engagement nevertheless seems highly necessary to meet the challenges associated with climate change. This leads to the question of whether the inherent distance of the climate change phenomenon can be bridged rather than reduced.

7.1.2 Reducing the distance or bridging it through global identification?

Similar to my own reasoning when I developed my research questions, Brügger, Dessai et al. (2015) state in their reflection on proximising climate change that "it cannot be taken for granted that people do not care about distant places and things and would not take action on behalf of these" (p. 1033). Hence, reducing distance might not always be necessary or useful. They further mention that "fondness for a place may also vary as a function of how strongly individuals identify and feel connected with people who live in that place" (p. 1033). To carry this idea further, identifying and feeling connected with people all over the world might result in fondness for the world as a whole, including geographically distant places. In my research, I aimed to elucidate whether the concept of a global identity (i.e., identification with and caring for all humanity; McFarland et al., 2013) might help explain why proximising does not always have effects. On the basis of evidence from prior studies that revealed correlations between global identity and proenvironmental and climate change-related outcomes, I assumed that the more individuals identify with people all over the world, the more relevant they might evaluate the global issue of climate change and associated communication (H6a), and the more they might be motivated to take climate protective action (H6b) and acquire climate change-related knowledge (H6c). Moreover, I supposed that people with a strong global identity might regard climate change and associated communication as relevant regardless of whether they perceive the consequences of climate change as affecting mainly other people in distant places (i.e., the relation between psychological socio-spatial distance and relevance attribution might be weaker for them). In other words, they might bridge the psychological socio-spatial distance of global climate change (H8).

In Study 1, I assessed global identity as a trait, differentiating between two theoretically proposed subdimensions named self-definition (i.e., the mere self-categorisation to all humanity as an inclusive ingroup which is perceived as consisting of similar people) and self-investment (i.e., solidarity and caring for people all over the world; Reese et al., 2015). Both global self-definition and self-investment directly and positively predicted the personal and societal relevance attributed to climate change (confirming H1.6a). The relations were of medium size. Moreover, they positively predicted climate protective behaviour directly and indirectly through relevance attribution (confirming H1.6b). Total relations were of medium size. Global self-definition and self-investment did not directly predict how much people knew about the climate system and climate protective behaviours, but did positively predict it indirectly through relevance attribution (supporting H1.6c, even though the indirect relation was not specified in the hypothesis a priori). These indirect relations were of small size. Contrary to expectations, people evaluated climate change as more personally and societally relevant when their psychological socio-spatial distance was lower regardless of the strength of their global identity. Hence, identification with people all over the world and concern for their well-being did not bridge the psychological socio-spatial distance of climate change (disconfirming H1.8).

A measure of global identity as a trait was also included in Study 2. Global self-definition did not predict the relevance attributed to the provided news text on climate change (disconfirming H2.6a), three indicators of climate protective behaviour (disconfirming H2.6b), or climate system and climate protective behavioural knowledge (disconfirming H2.6c). Global self-investment also did not predict the relevance attributed to the provided news text on climate change (disconfirming H2.6a) or climate system and climate protective behavioural knowledge (disconfirming H2.6c). However, it positively predicted the three indicators of climate protective behaviour (i.e., amount of information viewed on climate protective engagement options, time spent viewing this information, and donation to a climate protection organisation; confirming H2.6b). The total relations were of small to medium size. Neither dimension of global identity interacted with psychological socio-spatial distance of climate change in predicting the relevance attributed to the news text on climate change. However, psychological socio-spatial distance was not related to relevance attribution in this study at all. Hence, I found no bridging of psychological socio-spatial distance among people with a strong global identity in Study 2 either.

I had further reasoned that making global identity salient while receiving a news text on climate change might increase the relevance attributed to this news text (H7a), climate protective behaviour (H7b), and climate change knowledge (H7c). Moreover, I supposed that the negative relation between psychological socio-spatial distance and relevance attribution might be weaker, if global identity as a human is made salient. In other words, making global identity salient might bridge the psychological socio-spatial distance of global climate change (H9).

Study 3 was therefore designed to investigate the effects of making global identity salient through communicative means in the situation of receiving a news text about climate change. Before reading the news article, participants watched either a control video showing an underwater world or a video showing a man dancing with people all over the world, which communicated a feeling of connectedness. The connectedness video did not increase the relevance attributed to the provided news text (disconfirming H3.7a), climate protective behaviour (disconfirming H3.7b), or climate change knowledge (disconfirming H3.7c). However, video condition interacted with psychological socio-spatial distance of climate change in predicting relevance attribution to the news text. While participants receiving the control video evaluated the news text on climate change as less relevant the more they perceived climate change as affecting mostly other people in far-off locations, there was no such relation for participants receiving the video communicating connectedness between people (confirming H3.9). Moreover, for the latter group, the communicated proximity vs. distance in the news text did not indirectly predict climate protective behaviour and climate change knowledge. This result suggests that raising a feeling of connectedness through communicative means might be a way to bridge the distance of climate change communication and render issues that are perceived as affecting mainly other people in far-off locations more relevant to recipients.

The results of this study did not conclusively answer the question of whether the video explicitly increased the salience of global identity as conceptualised in my theoretical argument. A measure of situational global identity at the end of the study, after the climate change-related measures, asked participants about their global self-definition and self-investment at the current moment. Participants in the two video conditions did not differ in this situational measure. However, in retrospect, it is not possible to determine whether this was due to a) the video not raising global identity salience, b) the situational salience not lasting long enough to be detected at the end of the study, c) the situational salience being too subtle to be detected by an explicit measure, or d) the measure not accurately capturing situational global identity rather than trait global identity. Follow-up research needs to illuminate these possibilities (see Chapter 0).

In an additional analysis, I examined the predicting and moderating role of the situational global identity measure in a parallel manner to the analyses of global identity as a trait in Study 1 and Study 2. The pattern did not differ for the global self-definition and global self-investment dimensions. The more participants expressed a salient global self-definition or self-investment, the more relevance they attributed to the provided news text on climate change. Moreover, salient global self-definition and self-investment predicted one of the four assessed indicators of climate protective behaviour (i.e., the amount of information viewed on climate protective engagement options) and climate protective behavioural intentions both directly and indirectly through relevance attribution. The total relations were of medium size. I also found small positive indirect relations between salient global self-definition and self-investment and the further three indicators of climate protective behaviour (i.e., time devoted to the information on climate protective behavioural options, number of climate initiatives supported in the budget allocation task, amount of money allocated to them) as well as climate system knowledge and climate protective behavioural knowledge through higher relevance attributed to the news text. There was no significant interaction between psychological socio-spatial distance and salient global self-definition or self-investment in predicting relevance attributed to the news text. Hence, salient global identity, as assessed by the explicit self-report measure, did not bridge the psychological socio-spatial distance of climate change.

In conclusion, the results of my studies with respect to global identity suggest that considering this concept in research aimed at understanding people's relation to climate change in general and the reception of climate change communication in particular seems fruitful. In Study 1, global identity conceptualised as a trait predicted the relevance attributed to the climate change issue, climate protective behaviour, as well as climate change knowledge indirectly through relevance attribution. Moreover, in Study 2, the dimension global self-investment predicted climate protective behaviour. The finding that the trait measure of global self-investment was a broader predictor than the trait measure of global self-definition complements the research by Reese et al. (2015). In their studies, they also found self-investment to be more broadly predictive of various outcomes reflecting global engagement (for details, see Chapter 2.5.1). In Study 3, one's feeling of global identity in the current moment predicted the relevance attributed to a news text provided on climate change and climate protective behaviour, as well as climate change knowledge communicated in the text indirectly through relevance attribution. However, as the video aimed at increasing the situational salience of global identity did not impact this measure, it might have instead assessed a trait, comparable to Study 1 and Study 2.

Global identity as measured in the self-reported questionnaires did not bridge the distance of climate change (i.e., the relation between psychological socio-spatial distance and relevance attributed to the climate change issue was not weaker for people with a stronger global identity). However, the video communicating connectedness between people around the world had such a bridging effect (i.e., while participants receiving the control video evaluated the provided news text on climate change as less relevant the more they perceived climate change as socio-spatially distant, there was no such relation for participants receiving the connectedness video). Hence, while reducing distance by proximising climate change might be one communicative approach to increase issue relevance, bridging the distance by raising a feeling of connectedness might complement this strategy.

7.1.3 Can communicating knowledge support climate protective behaviour?

Recently, frequent doubts have been raised as to whether knowledge is a necessary precondition for climate protective behaviour and, as an implication of this, whether conveying knowledge is necessary or useful for motivating climate protection (e.g., Shi et al., 2016). One reasoning suggests that behavioural knowledge about climate protective actions might be more important than system knowledge about climate change.

A first approach to gaining insights as to whether knowledge determines behaviour on the basis of my data is to examine whether climate change knowledge is related to climate protective behaviour, even though such correlations cannot illuminate the causal direction. In Study 1, the more participants knew about the climate system (i.e., about CO_2 and the greenhouse effect, climate change, its causes, and expected consequences) as well as climate protective behaviours, the more climate protective behaviour they engaged in (i.e., as assessed by their self-report on 35 behaviours in the domains of transport, energy use, resource use and consumption, and political or social behaviours). The relations were both small to medium and did not differ in size. This correlation could imply, on the one hand, that knowledge might be a precondition for climate protective behaviour. However, behavioural knowledge does not seem to be more important. On the other hand, behaving in a climate friendly way might also precede further knowledge acquisition attempts, or they might impact each other mutually. Finally, the correlation could also be caused by third variables.

In Study 2, neither climate system knowledge nor climate protective behavioural knowledge regarding the communicated contents of a provided news text were significantly related to the observed indicators of climate protective behaviour, which were assessed after news reception (i.e., amount of information viewed on climate protective engagement options, time devoted to this information, and donation to a climate protection organisation). Hence, the results of this study do not suggest that knowledge might be a precondition for climate protective behaviour or vice versa. However, the study was underpowered to detect small relations.

In Study 3, climate system knowledge and climate protective behavioural knowledge regarding the communicated contents of a provided news text were related to three of the four observed indicators of climate protective behaviour, which were assessed after news reception (i.e., time devoted to information on climate protective engagement options, number of supported climate initiatives in a hypothetical budget allocation task, budget allocated to these initiatives) and climate protective behavioural intentions (i.e., assessed by self-report on 24 behaviours in the domains of transport, energy use, resource use and consumption, and political or social behaviours). Similarly to Study 1, the relations were small to medium and did not differ in size between system and behavioural knowledge.

In outlining my research approach, I argued that media are central to conveying scientific knowledge about climate change because contact with scientists or politicians is rare. One way to gain insights into whether conveying knowledge through media, in particular, predicts behaviour is to examine whether contact with climate change communication in media is related to climate protective behaviour, even though the causal direction cannot be determined. The results of Study 1 did not reveal any relations between climate protective behaviour and self-reported contact with the climate change issue through the assessed offline and online media outlets. Hence, current climate change communication in these media outlets might not encourage climate protective behaviour. Therefore, attempts to improve climate change communication seem necessary if the strategic goal is to motivate climate protection. However, when summing up contact with the issue through all assessed media channels, I found a small to medium positive correlation between media contact and climate protective behaviour. On the one hand, this correlation could indicate that contact with the issue through diverse channels might have the potential to motivate climate protection. On the other hand, people who behave in a climate protective manner might be more attentive to climate change communication in the media. Climate system knowledge was positively predicted by issue contact through public TV, brochures, and the Internet in general. Climate protective behavioural knowledge was positively predicted by issue contact through brochures, the Internet in general, and online newspapers in particular. The relations were small to medium. Hence, these media outlets might convey climate change knowledge. On the other hand, the correlation can also be interpreted as indicating that people who are already knowledgeable about climate change are more attentive to climate change-related information in these outlets. When summing up contact with the issue through all assessed media channels, I found a small to medium positive correlation between media contact and climate system knowledge and a small correlation with climate protective behavioural knowledge. On the one hand, this could indicate that contact with the issue through diverse channels has the potential to convey knowledge. On the other hand, knowledgeable people might be more attentive to climate change communication in the media.

In Study 2, I found a medium to strong correlation between prior contact with messages about climate change in the media in general and climate system knowledge. However, prior media contact was not related to behavioural knowledge and climate protective behaviour. Hence, this study suggests that current climate change communication in the media might tend not to encourage climate protective behaviour.

A further approach to gaining insights into whether conveying knowledge through media determines behaviour is to expose people to media communication and compare them to a control group that did not receive this communication. Based on the experimental evidence from Study 2 and Study 3, doubts need to be raised as to whether conveying knowledge through a news text promotes climate protective behaviour. In Study 2, while both news texts (proximity and distance versions) increased climate system and behavioural knowledge compared to a control group receiving no stimulus, the indicators of climate protective behaviour did not differ between the experimental groups and the control group. In Study 3, the news text communicating climate change as proximal increased behavioural knowledge compared to a control group receiving no stimulus, but again, the indicators of climate protective behaviour did not differ between the experimental groups and the control group. In order to more strictly test whether conveying behavioural knowledge is more important or useful for motivating climate protective actions than conveying system knowledge, an experimental approach that compares the effects of media stimuli communicating only one form of knowledge will be necessary.

Hence, to summarise these findings, I conclude that a relation between climate change knowledge and climate protective behaviour seems to be present but rather small. Existing climate change communication might convey climate change knowledge but not be particularly successful in motivating climate protective action. The classical format of a news text used in my experimental studies might not be an optimal means of motivating climate protective engagement, at least not as a one-time intervention. As the amount of contact with the issue through diverse media channels was related to climate protective behaviour in Study 1, a communication strategy aimed at supporting climate protection might profit from involving several media channels.

7.2 Methodical contributions extending prior research

In this section, I emphasise the specific contributions I sought to provide with this research in terms of the methods employed and how they extend prior research. First, I aimed to disentangle the inconsistent results of prior research on proximising climate change in communication. I noticed that most studies did not include the variable of psychological distance and a corresponding measure in their design. There were two exceptions: one study varying socio-spatial proximity vs. distance in communication included an overall measure of psychological distance but did not differentiate between dimensions (Brügger et al., 2016). A second study varied all four dimensions of psychological distance in communication (i.e., social, spatial, temporal, hypothetical, used a measure that differentiated among these four dimensions, and found effects for psychological social, spatial, and hypothetical but not temporal distance (Jones et al., 2017). Hence, I found no study which specifically examined the effect of the communication strategy of proximising climate change by focussing on local consequences for the audience, thus addressing social and spatial distance, on the psychological socio-spatial distance of climate change. Therefore, it was not clear whether psychological socio-spatial distance changes in reaction to receiving information on climate change that communicates socio-spatial proximity vs. distance. Nor was it clear whether psychological socio-spatial distance is related to the examined outcomes reflecting public engagement. By including a measure of psychological socio-spatial distance, I sought to clarify whether people's perception of the climate change issue is affected by communication in the first place. In addition to the measure of the psychological socio-spatial distance of climate change for recipients, I included perceived communicated social, spatial, temporal, and hypothetical distance in the news text as a direct manipulation check. In both experiments, social and spatial proximity in communication were differentially perceived. Moreover, I could show that perceiving that climate change is communicated as distant in a news text is not equivalent to perceiving climate change as a distant phenomenon oneself (i.e., psychological socio-spatial distance). While communicated socio-spatial proximity in the news text was recognised in both experiments, it translated into reduced psychological socio-spatial distance of climate change in Study 3 only, not in Study 2.

Moreover, I aimed to model the implicitly assumed mechanism behind a possible effect of proximising climate change on climate protective behaviour and climate change knowledge in a path analysis (i.e., through reduced psychological socio-spatial distance, which might in turn predict increased relevance attributed to the news portrayal of the issue, which might in turn predict climate change knowledge and climate protective behaviour). In the path analysis for

Study 3, I indeed found evidence for this mechanism, even though it has to be kept in mind that only the first step of the process (i.e., the effect of proximising on psychological socio-spatial distance) can be interpreted as causal impact. Moreover, the indirect relations with the indicators of climate protective behaviour and climate change knowledge were very small. To my knowledge, only one prior study had modelled a process underlying possible effects of proximising climate change. However, this study varied all four distance dimensions in communication at the same time. It found that communication of distance vs. proximity indirectly predicted lower mitigation intentions through higher psychological distance and lower concerns about climate change (Jones et al., 2017). Hence, this study did not investigate actual climate protective behaviour and climate change knowledge as outcomes. Moreover, it did not include relevance attributed to the communication as assumed mediator, but rather concerns about climate change.

As a second specific contribution, I aimed to use profound measures and, if necessary, develop new measures in my research. While prior studies on climate change-related outcomes have often assessed constructs with only a few, and sometimes single items, I used more extensive scales in order to increase reliability. In Study 1, I deployed elaborative measures to assess climate change knowledge (Frick et al., 2004; Shi et al., 2015). On the basis of these, I developed knowledge measures for climate change information communicated in the news stimuli used in Study 2 and Study 3. These measures of climate system knowledge and climate protective behavioural knowledge proved to be satisfactory in terms of item and model fit. Rasch model-based person reliability was comparable to or even better than in prior research with similar Rasch model-based knowledge measures (Frick et al., 2004; Kaiser & Frick, 2002). However, in order to better differentiate among less knowledgeable people, the construction of further easy questions would be worthwhile (for details and suggestions, see Chapter 7.4.4.2). I adapted the GEB scale (Kaiser & Wilson, 2004) to assess climate protective behaviour in Study 1 and climate protective behavioural intentions in Study 3. While the authors usually use between 30 and 65 items, I sought to find a minimal compromise for my studies in order to limit questionnaire length and burden for participants. The 35-item scale in Study 1 proved to be satisfactory. The 24-item scale in Study 3 proved to be satisfactory with regards to item fit. Person reliability and model fit were also acceptable, but could be enhanced by including further items. In addition to assessing self-reported behaviour, I deemed it worthwhile to include observable indicators of behaviour in the laboratory experiment in Study 2 (i.e., information and donation behaviour) and the online experiment in Study 3 (i.e., information behaviour and hypothetical budget allocation task). The measures of information behaviour and the budget allocation task were newly developed and drew upon similar prior research. Based on the results of Study 1 and Study 2, Study 3 provides an improved, short but reliable and well-fitting 4-dimenisonal scale to assess the psychological distance of climate change. Moreover, Study 3 presents a first idea of how to measure climate change-related construal level, which could inspire further research.

7.3 Theoretical implications

7.3.1 Proximising and the psychological distance of climate change

The theoretical implications that can be drawn from my research are connected to the methodical contributions I sought to make. Experimental research on CLT (Trope & Liberman, 2010) often assumes that the objective proximity vs. distance of objects or events affects psychological distance without explicitly assessing people's subjective perceptions with a measure of psychological distance. Similarly, most research on proximising climate change in communication does not assess whether communication of proximity vs. distance impacted psychological distance. In general, it is my impression that communication research often seems to assume that varying subtle aspects of communication almost automatically finds its way into people's perceptions, even though this assumption is not explicitly verbalised. In the path model for Study 3, I found that proximising climate change by focussing on local consequences decreased the psychological socio-spatial distance of the issue, whereas in Study 2 this was not the case. However, Study 2 was underpowered to detect small effect sizes. Still, I suggest that the basic theoretical assumption that objective (communicated) proximity or distance translates into corresponding subjective perceptions still needs to be substantiated or called into question in future research that includes measures of people's psychological distance.

Moreover, on the basis of my findings that psychological socio-spatial distance was barely influenced, if at all, by communication, I suggest theoretical reflection how stable the psychological socio-spatial distance of climate change is and how it emerges. These questions could be empirically investigated by longitudinal approaches that assess psychological distance and possible predictors over time. These assessments should include measures of contact with climate change communication as well as other possible impacts, such as personal experiences with climate change-related events. Moreover, repeated exposure to news communicating the proximity or distance of climate change could be investigated. Extending my research design, experiments could include pre-measures of psychological distance before media reception.

Finally, the development of psychological distance of climate change could be investigated among children who are first learning about climate change in school.

Psychological socio-spatial distance was not consistently related to relevance attributed to the climate change issue, climate change knowledge, and climate protective behaviour in my studies. CLT does not clearly specify whether main effects of psychological distance on cognitions and behaviours are expected. In line with Brügger, Dessai et al. (2015), I reasoned that advocates of proximising climate change seem to implicitly assume the following process: proximising might decrease the psychological distance of climate change, which in turn makes the issue more relevant. Relevance, in turn, is expected to raise motivation to acquire knowledge from the message and to take action for climate protection. While I could not confirm this model in Study 1 and Study 2, the results of Study 3 – in my view the most elaborate of the three studies – support this assumption. However, I would like to emphasise again that the indirect relations were very small and that only the first predictor in this process (i.e., communicated socio-spatial proximity) was experimentally varied and can thus be interpreted as a causal impact factor.

Furthermore, the results of Study 3 show that the relation between the psychological socio-spatial distance of climate change and relevance attributed to news about the climate change issue can be influenced by the context. The relation disappeared for participants who received a video communicating connectedness between people around the world before news reception. They considered the received climate change communication as equally relevant regardless of whether they perceived climate change as psychologically proximal or distant. Moreover, communicated proximity vs. distance in the news text did not indirectly predict climate protective behaviour and climate change knowledge for them. This result suggests that raising a feeling of connectedness through communicative means might be a way to bridge the distance of climate change communication and render issues that are perceived as affecting mainly other people in far locations more relevant to recipients. Therefore, I suggest that researchers focus on interacting mechanisms that might bridge the distance when theorising the psychological distance of climate change (for a similar argument, see Brügger et al., 2016).

Finally, my research implies that it is worthwhile to conceptually distinguish between the communicated proximity of an issue, psychological proximity of an issue, and issue relevance. Some theoretical accounts, for example in the research tradition of news values (Eilders, 2006), seemed to theoretically equate proximity and relevance. However, I argued that the distance of an issue might not necessarily imply irrelevance. Accordingly, I found that the relations between psychological socio-spatial distance of climate change and relevance attributed to the issue were not strong enough to speak of convergent constructs. Moreover, as outlined, the relation was influenced by raising a feeling of connectedness and thus seems to be context-sensitive.

7.3.2 Global identity perspective on climate change

The psychology of environmental issues in general and of climate change in particular has mostly been investigated from an *individualistic perspective*. Ferguson, McDonald, and Branscombe (2016) summarise three major principles of this perspective. The first principle assumes that people are motivated by their self-interest. Hence, research has examined internal motivations such as attitudes, norms, needs, or values. Prominent models in environmental psychology including these motivations are the TPB (Ajzen, 1991), the norm-activation model (Schwartz, 1977), value-belief-norm theory (Stern, Dietz, Abel, Guagnano, & Kalof, 1999), and goal framing theory (Lindenberg & Steg, 2007). The second principle assumes that people are resistant to behaviour change, because these internal motivations are relatively stable. The third principle assumes that social groups represent external motivations and are rather weak and unstable compared to internal motivations.

In recent years, the individualistic focus in research on climate change has been complemented by a *social identity perspective*, which is also based on three major principles (Ferguson et al., 2016). The first principle assumes that motivation is an outcome of self-categorisation rather than solely determined by individual self-interest. People can categorise themselves as individuals (i.e., personal identity) or group members (i.e., social identity). When they self-categorise as group members, they focus on collective interests rather than individual self-interests. The second principle assumes that context changes can lead to changes in self-categorisation. Hence, personal or social identities can be more salient depending on the context. The third principle assumes that social groups are used as frames of reference guiding people's motivation and behaviour. 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, while individual self-interests become less relevant.

Behaviour change interventions based on the individualistic perspective mostly deliver information. They try to tailor or target these messages to particular audiences, which are characterised by their individual motivations (e.g., their values; Corner et al., 2014). Moreover, they try to foreground individual benefits such as financial incentives. From the social identity perspective, behaviour change is primarily seen as an outcome of changing contexts and the comparisons between individuals and their social groups that arise in these contexts (e.g., Rabinovich, Morton, Postmes, & Verplanken, 2012; for an overview, see Ferguson et al., 2016).

Recently, Fritsche et al. (2018) published an extensive review of the social identity perspective, which they used to develop the *social identity model of proenvironmental action* (SIMPEA). They argue that “social identity is the human capacity to define the self in terms of 'We' instead of 'I', enabling people to think and act as collectives, which should be crucial given personal insufficiency to appraise and effectively respond to environmental crises” (p. 245). As these crises, of which climate change is one, have the characteristics of common good dilemmas, they can only be solved by collective rather than individual efforts.

SIMPEA suggests four basic social identity processes that impact the appraisal of and response to large-scale environmental crises. The model assumes that environmental action is often elicited indirectly by an appraisal of an environmental crisis. If the appraisal indicates that the crisis is relevant for individuals themselves or their ingroups, it will result in 1) emotions and motivations on the personal level (e.g., helplessness, personal threat) or collective level (e.g., collective guilt, collective threat). These emotions and motivations, in turn, initiate the social identity processes of 2) ingroup identification, 3) collective efficacy beliefs, and 4) ingroup behaviour norms and goals. These three processes interact in affecting action and appraisal. Ingroup identification means clear self-categorisation and investment in a group (e.g., environmentalists). Ingroup behaviour norms and goals determine what these groups stand for (e.g., reducing consumption in order to reduce one's carbon footprint). The higher the ingroup identification, the more these norms and goals give direction and purpose to people’s action. Moreover, actions in line with ingroup norms and goals become more likely as people's belief that the group can achieve its goals rises (i.e., collective efficacy).

My results on global identity can be integrated into SIMPEA as processes of ingroup identification. Fritsche et al. (2018) state that “climate change may not feel like a personal crisis for contemporary Northern Europeans or U.S. Americans, whereas it might feel so if they mentally include people in other parts of the world or future generations in their (collective) self” (p. 246). Accordingly, they cite prior results on relations between global identity and climate change-related outcomes as indicators of a relation between such an inclusive group identification and climate change appraisal (p. 254; see also Chapter 2.5.2). These prior studies showed that global identity was associated with climate change concern (Katzarska-Miller et al., 2012; Running, 2013), belief in anthropogenic causes (Devine-Wright et al., 2015), collective action intentions on behalf of victims of climate change injustice, solidarity with affected people, anger at climate change injustice, and collective efficacy to fight the injustice of climate change (Barth et al., 2015). The results of my research complement this evidence by explicitly showing a relation between global identity and climate protective action as well as climate change appraisal in the form of relevance attributed to the issue and associated communication. Future research could extend my findings within the framework of SIMPEA and investigate, for example, interactions between global identity and collective efficacy beliefs that humanity can achieve the goal of climate mitigation.

Moreover, there should be theoretical reflection on how global identity develops. An idea I suggest is to examine the relationship between global identity and mindfulness (Brown & Ryan, 2003; Kabat-Zinn, 1994). In mindfulness practices such as yoga or meditation, teachers often express the goal of evoking a feeling of connectedness among all people in the world. Recently, several studies have been published that show a relationship between trait mindfulness and sustainable behaviour or an impact of mindfulness practices on sustainable behaviour (Amel et al., 2009; Barbaro & Pickett, 2016; Barber & Deale, 2014; Geiger, Otto, & Schrader, 2018; Jacob, Jovic, & Brinkerhoff, 2009; Panno et al., 2017; Patel & Holm, 2017; Wang, Geng, Schultz, & Zhou, 2017, for a review, see Tezel & Giritli, 2018). Moreover, mindfulness is associated with connectedness to nature (for a meta-analysis, see Schutte & Malouff, 2018). To my knowledge, no research has examined a relationship between global identity and trait mindfulness or whether mindfulness practice fosters a global identity. However, Hutcherson, Seppala, and Gross (2008) showed that a meditation practice intervention increased social connectedness. Hence, a correlational approach could illuminate whether trait mindfulness predicts global identity. Subsequently, an experimental approach could investigate whether mindfulness practice has an impact on the feeling of connectedness with humans all over the world.

7.4 Limitations and suggestions for future research

Having already outlined the main limitations of the individual studies in Chapters 4.4.2, 5.4.2, and 6.4.2, I will now discuss them on a combined and more general level and suggest paths for future research.

7.4.1 Samples

All three samples were convenience samples and thus not representative of either the German or the UK population. Representativeness can only be achieved through random sampling, which is highly cost intensive and was not feasible for me. As a consequence, descriptive statements at the population level cannot be inferred from my research (e.g., about the distribution of psychological distance among Germans). However, I can provide evidence on the relations between the assessed variables, which should be replicated in diverse, ideally representative samples before being generalised. Beyond generalisation to the German or UK population, it would also be valuable to replicate the study approach in other countries and more diverse cultures, as public perceptions of climate change differ between nations (Capstick, Whitmarsh, Poortinga, Pidgeon, & Upham, 2015). It would be specifically interesting to include countries for which climate change effects are predicted to be more severe than in Europe or where threats associated with climate change, such as flooding, are already being experienced more often. Personal experience of such threats has been found to predict climate-related outcomes such as willingness to save energy (Spence et al., 2011; for an overview, see McDonald et al., 2015).

Study 2 was underpowered to detect small effect sizes. I had decided to restrict the sample to a size necessary to detect medium effect sizes. This was justified by the reasoning that effect sizes are usually stronger in laboratory compared to field studies, as the setting is controlled and reduces noise in the data resulting from external influences. Moreover, effects of medium size are of higher practical significance. Based on the results of the three studies, true effect sizes for many associations of interest are likely to be small to medium. A critical replication of my findings is crucial in order to gain more confidence as to whether the small indirect relations, in particular, are actually present. Therefore, future studies should be powered to detect even small effect sizes and thus involve larger samples, as was the case for Study 3. The results of my studies can be used for a priori power estimation. In retrospect, I also argue that detecting small effect sizes is indeed of practical relevance with regard to my research interests. Such small effects of exposure to one stimulus of climate change communication might accumulate when people repeatedly receive climate change communication, which could be the case in practical settings. Therefore, in the following section, I suggest examining repeated exposure.

7.4.2 Designs

An important limitation of my studies is their cross-sectional design. This design should be extended to include longitudinal approaches for four reasons. First, in my experiments, people were only exposed to a media stimulus once. However, repeated exposure would model real media consumption more realistically and thus enhance external validity. Moreover, from a strategic perspective, it would be interesting to know whether more frequent media exposure is necessary to uncover consistent and perhaps stronger effects on public engagement. Such an approach in future studies can be informed by research on repeated framing (e.g., Lecheler, Keer, Schuck, & Hänggli, 2015).

A second limitation arising from the cross-sectional design was that all measures were assessed at the same time point or shortly after one another. This compromises the ability to draw causal conclusions. Three requirements have to be met to draw firm causal conclusions about an effect of X on Y from empirical evidence: 1) the variables X and Y have to be correlated, 2) the variable X has to precede Y in time, 3) third variables Z possibly causing the relation between X and Y have to be excluded or controlled for. In Study 1, Requirements 2 and 3 were not met. Correlational panel designs will fulfil Requirement 2. Requirement 3 can only be satisfactorily met in experimental research by manipulating X and subsequently assessing Y. In Study 2 and Study 3, only the first step of the assumed process behind proximising (i.e., communication of proximity vs. distance influences psychological distance, which in turn impacts relevance attribution, which in turn impacts behaviour and knowledge) was experimentally manipulated (i.e., communicated socio-spatial proximity vs. distance in the news text). Thus, causal impacts can be inferred only for these effects. Kline (2016, p. 135) notes that strictly speaking, the term mediation should not be used in such a case, even though it is widely applied. Instead, one should speak only of indirect relations. I also avoid the term indirect effects.

Third, by assessing variables at one time point only, cross-sectional designs compromise the ability to draw conclusions about long-term changes. Longitudinal research is necessary to determine the duration of media effects on climate change-related outcomes. This is of high practical as well as theoretical relevance (Howell, 2014).

Fourth, in a longitudinal approach, baseline values for psychological socio-spatial distance of climate change before exposure to climate change communication in the experimental setting can be assessed. This would give insights into a) how stable psychological socio-spatial distance is, and 2) whether the baseline level determines changeability. It is possible that only people with a high psychological socio-spatial distance are affected by proximising climate change in communication.

7.4.3 Stimuli

7.4.3.1 Communicating proximity of climate change

In the stimuli for Study 2 and Study 3, proximity in both the text and the picture were varied at the same time. Therefore, the unique contribution of each component cannot be identified.

Follow-up research could vary and examine proximity in texts vs. visuals more systematically (Hart & Feldman, 2016; Powell, Boomgaarden, Swert, de Vreese, & Vreese, 2015).

In Study 2, proximity was communicated by portraying climate change consequences as affecting recipients' country of residency (i.e., Germany) and compared to communicating climate change as a global phenomenon mostly affecting developing countries. A slightly different and even more standardised approach was chosen in Study 3. Here, proximity was also communicated by portraying climate change consequences where recipients lived (i.e., the UK), but compared to a distance condition that addressed the same consequences in a specific remote location (i.e., Bangladesh). In both studies, social and spatial distance were confounded, as this is part of the policy recommendation of proximising climate change. However, if future studies wish to cleanly examine different dimensions of distance with respect to CLT, the experimental communication could discuss different groups of people who experience threats associated with climate change in a remote location (i.e., keeping communicated spatial distance constant). These people could be residents of one's own country (e.g., Germans who become victims of flooding during a holiday in Bangladesh) or residents of the remote country (e.g., Bangladeshis who become victims of flooding). Reporting about people who are similar to oneself might reduce the psychological social distance of climate change. Reporting about the fates of Germans abroad is a common form of news reporting and thus externally valid.

The effects of communicating socio-spatial proximity vs. distance could also be studied for climate change-related issues other than consequences. One example is communicated proximity vs. distance of causes (e.g., portrayals of German vs. US or Chinese CO_2 emissions to a German audience), because this is often part of news reporting. A second example would be the proximity of mitigative actions. A mail survey study addressing this issue was conducted by Yarnal, O'Connor, and Shudak (2003) in the United States with residents of Pennsylvania. They examined the effects of communicating policy measures to mitigate climate change involving sacrifice (e.g., the loss of coal mining jobs) as affecting their community (proximity) vs. the country (distance). Willingness to support mitigation policy measures with one's vote and to undertake voluntary actions to reduce greenhouse gas emissions was higher in the distance condition. The interplay between communicating the proximity of climate change consequences and of mitigative actions could be examined. For example, it could be investigated whether communicating negative climate change consequences for one's own country only motivates climate protective behaviour if mitigative actions are not communicated as affecting one's own country and hence sacrifices are not expected.

Apart from studying socio-spatial proximity versus distance, it would also be interesting to examine the effects of reducing the distance and bridging the distance with respect to the other two dimensions suggested in CLT, namely temporal and hypothetical distance (see e.g., Morton et al., 2011). One idea to bridge the temporal distance of climate change (i.e., the perception that consequences will mostly arise in the distant future) could be varying the time metrics (i.e., the units such as days, months, years, or decades in which time is considered). This idea was inspired by research by Lewis and Oyserman (2015). They argued that people are more likely to consider the future in their actions when the future self is more connected to the current self, because the future is experienced as more relevant. Furthermore, they asked "whether people can be induced to act in support of objectively distal events without necessarily making the event itself feel closer by making the future feel psychologically relevant" (p. 2). Hence, they were concerned with bridging the temporal distance of events rather than reducing it. In several experiments, they found that fine-grained time metrics (e.g., days) compared to gross-grained time metrics (e.g., months or years) led to future-related actions being planned earlier. Moreover, thinking about the future in days gave people the feeling that their future self is more connected to their current self, which in turn was related to experiencing the future and current self as more congruent. The more congruence participants experienced, the less they were willing to discount the future rewards of actions in favour of current rewards. Transferring these findings to the climate change issue, expected future consequences could be communicated either in the fine-grained time metric of years or the gross-grained time metrics of decades or even centuries, which are often used in news reporting. The willingness to take mitigative actions could be compared in the different conditions. Moreover, a 2 (communicated temporal distance: low vs. high) × 2 (communicated time metric: fine-grained vs. gross-grained) between-subjects design could reveal whether time metrics interact with actual time periods and hence bridge the temporal distance of future climate change consequences (i.e., psychological temporal distance might only be associated with attributing less relevance to climate change if gross-grained time metrics are communicated, whereas there might be no relation or a weaker relation if fine-grained time metrics are communicated).

A further extension could also be to experimentally examine the effects of climate change-related construal level. As an example of such research, Rabinovich et al. (2009) asked participants either to think about how they could decrease their carbon footprint and to list three ways of doing so (low-level construal) or why they want to decrease their carbon footprint and list three explanations for their reasons' importance (high-level construal). Adapting this approach, climate change communication could focus either on how to protect the climate or why to protect the climate and investigate whether this leads to differences in recipients' construal level, which might be in turn related to psychological distance, as assumed by CLT (Trope & Liberman, 2010).

7.4.3.2 Salience of global identity

The video communicating connectedness between people around the world did not influence the measure of global identity salience. Based on my results, I cannot determine whether this is because the video did not raise salience, the measure did not capture salience, or the increase in global identity salience was too subtle to be detected by an explicit measure. However, the finding that receiving the video interacted with participants' psychological socio-spatial distance in predicting the relevance attributed to the news text indicates that exposure to the video had a bridging impact. The manipulation check showed that the video reminded people of times when they felt close to and connected to others. Implicit measures such as a word stem completion task could be used to investigate whether words associated with global identity are more accessible after receiving the connectedness video compared to the control video (see e.g., Pavey et al., 2011).

In addition, I suggest examining alternative ideas to make global identity salient. In an experiment by Reese et al. (2015, see Chapter 2.5.3), pictures in the room displaying connectedness between people of different nationalities were found to result in stronger explicit self-reports of global identity as measured by the IWAH scale. Hence, visual material expressing similarities or connectedness of people all over the world could be used to raise the salience of global identity. These pictures could be applied as separate stimuli in research or embedded in climate change communication itself, for example, in a news text.

Second, global identity-related words (e.g., global, we, connected) could be implemented in climate change communication. In an indication that language can raise the salience of global identity, Tu et al. (2012) asked participants to complete a sentence-scrambling task that included words referring to either global or local identity. They found that global identity salience was higher relative to local identity salience in the global task condition (see Chapter 2.5.3 for details). Seyranian, Sinatra, and Polikoff (2015) embedded identity-related words in a communication intervention for saving water. They did not study global identity salience, but compared local social identity with personal identity salience. In the social identity condition, local city identity was rendered salient by employing inclusive language (e.g., we, us, our, local city identity, residents) and including a graphic logo and the city name. In the personal identity condition, they used individual language (e.g., I, you) and no logo and city name. Unfortunately, they did not assess identity salience. Combining both studies, approaches for raising global identity salience in climate change communication could consist of using inclusive language and global words compared to individual language and local words.

Third, in an experiment not involving global identity, but still an informative design, Rabinovich and Morton (2011) assigned English adults to two identity salience conditions. Participants were told that they would complete a minor motor task. In one condition, they saw a map of the UK and bordering countries and were asked to outline the border of Britain with a pen (salience of superordinate identity as British). In the other condition, they saw a map of the UK with visible borders between England, Scotland, and Wales and were asked to outline the borders between different parts of the UK with a pen (salience of subordinate identity as English). Unfortunately, the study did not include any measure of identity salience. However, their idea could be transferred to and tested for a national vs. global salience condition by providing people with either a map of a country and asking them to outline its border (national identity salience) or with a map of the whole world and asking them to outline the shape of its continents (global identity salience).

If the salience variation consists of a national identity condition vs. a global identity condition, it will be worthwhile to include measures of national identity and global identity (see e.g., the IWAH measure; McFarland et al., 2012). Moreover, possible effects of a match between communication and identity salience could be examined in a 2 (communication: national climate change consequences vs. global climate change consequences) × 2 (salience: national identity vs. global identity) between-subjects design (i.e., whether communication with a national focus is perceived as more relevant if national identity is made salient, whereas communication with a global focus is perceived as more relevant if global identity is made salient).

Finally, I suggest considering alternative media outlets and their potential to influence identity salience, such as virtual realities, games, films, or music. For example, Bachen et al. (2012) conducted a quasi-experiment with US high school students. Compared to a control group, global empathy and interest in learning about other countries were higher after playing a computerised simulation game in which participants inhabited the lives of people around the world. Compared to the passively received short video in my study, actively playing a game might be better suited to invoking a feeling of connectedness with and concern for people all over the world. Consequently, I particularly suggest examining more interactive and involving media outlets. Moreover, the video I used was very short. Longer exposure – for example, to films – might also have a stronger potential to raise the salience of global identity as a human.

7.4.4 Measures

Having already outlined specific limitations and suggestions regarding measures for the individual studies (see Chapters 4.4.2, 5.4.2, and 6.4.2), I will point out some more general considerations and possible enhancements here. They cover climate protective behaviour, climate change knowledge, and climate-related construal level.

7.4.4.1 Climate protective behaviour

Measuring behaviour in a meaningful way is in my view one of the biggest challenges in psychological research on climate change. While I assessed self-reported behaviour with a broad instrument in Study 1, I sought to use observable indicators in Study 2 and Study 3. Here, I assessed willingness to examine information on behavioural engagement options and the time devoted to this information, donation to a climate protective organisation, and behaviour in a hypothetical budget allocation task in which climate protective initiatives could be supported. An frequently used alternative option for observing behaviour that could be considered in follow-up studies is to construct hypothetical dilemma games (Hauser et al., 2014; Kortenkamp & Moore, 2006; Milinski et al., 2006; Milinski et al., 2008; Tavoni et al., 2011; van Vugt, 2009). Furthermore, small everyday behaviours could be observed in a laboratory scenario. Examples of indicators that have been used are the frugal use of material such as paper (Ahn et al., 2015; Longoni et al., 2014), the choice of an environmentally friendly product over another as study compensation (Schmitt et al., 2017), or the inclination to turn off the light when leaving the room (Werner, Cook, Colby, & Lim, 2012). I still think that there is room for creative approaches to assess behaviour and a particular need to reflect on how this can be realised in online as opposed to laboratory research. A first step would be to broadly review and systematise existing approaches in laboratory, field, and online research. Subsequently, there should be reflection on how to adapt or extend the laboratory or field approaches to online contexts.

Climate protective behaviour can take place in different domains. In my studies, I included behaviours in the domains of mobility, energy use, resource use and consumption, and political or social action. I consider it particularly interesting for future research to place greater emphasis on political and social actions. These can have a larger impact than individual behaviour change when they result in societal transformation. At the same time, my results revealed that these behaviours seem to be particularly difficult for people, as they were implemented or intended less frequently than behaviours in the other assessed domains. In

Stern's (2000) categorisation, these would be classified as activist behaviours (e.g., participating in demonstrations, petitions) and non-activist behaviours (e.g., voting) in the public sphere. However, they could also include social behaviours such as discussing the issue with other people. The measures of climate protective behaviour in Study 1 and of behavioural intentions in Study 3 contained some items on political and social actions, but could be extended in this regard. One possibility would be to outline future mitigative policy options that have been proposed by different political parties and to assess willingness to vote for these (see e.g., Drews & van den Bergh, 2015; Zahran et al., 2006). Moreover, as an observed rather than self-reported indicator, participants could be asked to sign a petition for a climate protective policy measure (this should be a simulated petition with subsequent debriefing).

7.4.4.2 Climate change knowledge

The knowledge measure in Study 3 was difficult for the general public sample, as indicated by a mean value of the Rasch-based person estimates below zero. In addition to constructing easier items, a true/false answer format could replace the multiple-choice format in order to decrease difficulty (e.g., similar to the items by Tobler et al., 2012). A further limitation arose from the open answer format. Here, I only coded contents mentioned in the stimulus news text as correct answers. Hence, some people knew correct alternative answers (e.g., alternative seasonal fruits or vegetables) that were neglected when estimating their knowledge. This might have led to an underestimation of participants' knowledge levels, particularly in the control group that did not receive the stimulus. In order to avoid this limitation and decrease difficulty, a closed answer format such as true/false statements could be used whenever possible.

There is discussion as to whether a “don’t know” answer option should be included in knowledge measures. Mondak and Davis (2001), for example, argued that allowing this option in measures of political knowledge leads to systematic understatement of knowledge. However, the experimental results by Luskin and Bullock (2011) contradicted their claim. The climate change knowledge scale by Tobler et al. (2012), which served as the basis for my measures, offered the don’t know option. Therefore, I decided to include it, too. However, future validation research on the measure should test whether this option leads to a general understatement of knowledge and whether it causes artificial group differences (e.g., because men might be more reluctant to choose the don’t know option than women; for a corresponding argument regarding political knowledge measures, see Mondak & Anderson, 2004).

Research on public knowledge in the political domain has argued that the structure of knowledge should be assessed in addition to factual knowledge (e.g., Eveland & Hively, 2008).

Example measures are knowledge structure density (e.g., Eveland & Schmitt, 2015) or combining knowledge accuracy with knowledge complexity (e.g., Kahlor & Rosenthal, 2009). Moreover, the discourse on political knowledge acquisition from media recommends assessing attention to and elaboration of the news as important predictors of knowledge by default to better understand the process of learning from the news (e.g., cognitive mediation model; Eveland, 2001). Research on climate change knowledge and climate change communication could be informed by this strand of research in the future.

7.4.4.3 Climate change-related construal level

Study 3 suggested a first idea for how to measure climate change-related construal level based on the response category width measure by Krüger et al. (2014). There was no relation between this measure and the psychological distance of climate change. Thus, the basic assumption of a relation between construal level and psychological distance proposed in CLT (Liberman & Trope, 2008) was not confirmed. However, future research beyond this first exploratory approach is needed to establish firmer conclusions. First, I suggest extending the measure by including more items. While the general response category width measure provided by Krüger et al. (2014) consisted of ten items, a short version with four of these items and four new items related to climate change was used in Study 3. In a next step, the instrument needs to be validated. In order to establish convergent construct validity, other approaches to measure construal level should be adapted to the climate change context as well. For example, I suggest developing a version of the behavioural identification form (Vallacher & Wegner, 1989), which is widely used to assess construal level. It measures people's preference for concrete (low-level) vs. abstract (high-level) linguistic expressions. For example, items can consist of behavioural episodes (e.g., "sticking to a diet") followed by a means-related (low-level; e.g., "eating less") as well as an ends-related (high-level; e.g., "being healthy") redescription of that behaviour, with participants asked to indicate their preference (see Krüger et al., 2014). A similar logic could be applied to climate protective behaviours (e.g., "turning off the light" redescribed as "pressing a switch" vs. "saving energy").

7.4.5 Extensions

While my research included cognitions and behaviours related to climate change, it did not take *emotions* into consideration. On the one hand, emotional distance could be examined as a predictor of climate change cognitions and behaviours (Leviston et al., 2014) apart from the psychological distance dimensions suggested in CLT (i.e., social, spatial, temporal, and hypothetical distance). On the other hand, emotions elicited by climate change communication could be investigated as a possible mediating mechanism behind the effects on behaviour change or resistance (Feldman & Hart, 2015, 2018; Hart, Stedman, & McComas, 2015; Smith & Leiserowitz, 2012). An example I find particularly interesting is compassion with climate change victims (Lu & Schuldt, 2016; Pfattheicher, Sassenrath, & Schindler, 2015). It could be compared whether communication about socio-spatially proximal victims results in higher compassion than communication about socio-spatially distant victims. Moreover, as mentioned in Chapter 7.1.1, it has been argued that proximising might exert adverse effects such as a feeling of overwhelming threat (Brügger, Dessai et al., 2015). In my experiments, I assessed communicated severity in the news text (i.e., how dangerous and strong the journalist portrays the issue) as a control variable, which did not differ between the proximity and distance conditions. However, individuals' feelings of threat should be included in future research to examine the effects of proximising on these.

My research was restricted to climate change communication as a specific field of sustainability communication. However, climate change can be viewed as a paradigmatic sustainability problem (Newig, 2011), and research on climate change can thus inform discourses on other societal risk issues as well. Future research should illuminate whether communication on *other topics within sustainable development* and corresponding challenges has similar effects through similar mechanisms (e.g., for a study that examined communicating proximity vs. distance of air pollution, see Mir, Behrang, Isaai, & Nejat, 2016). Currently, problems arising from plastic, and specifically microplastics, in the environment are discussed as a particularly pressing issue in politics and research (Pahl & Wyles, 2017). I can imagine that this phenomenon is perceived as psychologically distant from a European perspective, similar to climate change. Due to a functioning waste collection system, plastic in the environment is less visible here than in geographically distant locations. Hence, it might appear to affect mainly other people in remote countries (i.e., psychological socio-spatial distance). Moreover, uncertainty (i.e., psychological hypothetical distance) could arise from the constant public controversy as to whether recycling can solve the issue or whether plastic use must be reduced.

7.5 Practical implications

7.5.1 Communicating climate change

Proximising climate change by foregrounding local consequences in news portrayals has the potential to reduce the psychological socio-spatial distance of climate change: recipients who received a news text about local consequences were less likely to believe that climate change mostly affects other people in remote places compared to recipients who read about spatially distant consequences. Moreover, communicating local consequences positively predicted climate protective behaviour and knowledge about climate change communicated in the news portrayal through lower psychological socio-spatial distance and increased relevance attributed to the received news. Even though these positive relations were small, stronger positive effects might be found if people repeatedly receive local information. Moreover, negative impacts of communicating proximity seem unlikely. Therefore, I suggest that it is worthwhile to communicate local consequences.

At the same time, it does not seem necessary to neglect the global dimension of climate change and impacts for other people in remote locations. As an implication, decreasing communicated distance might be less effective, because individuals might already have established a rather stable perception of climate change as psychologically distant. Such a perception is not surprising but rather reasonable, because distance is inherent to the climate change issue from a European perspective. Instead of or in addition to communicating proximity, it might be important to explicitly deal with the distance of the phenomenon and find communicative ways to increase the relevance of distant events - bridging the distance as opposed to reducing the distance. One possibility inferred from my research could be to communicate connectedness between people around the world when distant events are reported.

7.5.2 Developing a global identity

When I explain my research topic to others, their first reaction is often: Global identification with people all over the world? But does that even exist? Is it possible to develop a global identity? These questions have been critically discussed in psychology as well as political science as well. While high hopes accompanied the idea of global citizenship after World War II alongside the formulation of human rights, recent accounts tend to be characterised by disenchantment in light of worldwide conflicts between social groups. For example, one concern is that the content and meaning of the social category of all humanity seems difficult to define in a culturally neutral way that does not foreground Western traditions (Rosenmann et al., 2016).

On the basis of my results, I can answer that interindividual differences do exist with respect to the measure I applied to assess global identity. These differences predicted how relevant the climate change issue was evaluated as and how much climate protective behaviour people engaged in. The development of global identity remains an issue to be examined. Moreover, it is still unclear whether promoting global identity leads to climate change engagement as a causal impact mechanism. One approach to gain insight into the question of how global identities emerge is to examine predictors of global identity (e.g., international intergroup contact, Römpke, 2017). Another approach is to develop and test practical interventions aimed at fostering global identification. These interventions could be informed by approaches developed within social identity research on transforming intergroup relations (Bliuc et al., 2015), perspective taking with other people (Faulkner, 2018; Pahl & Bauer, 2013), and social interaction (Smith, Thomas, & McGarty, 2015). Moreover, scientists and artists could work together to invent creative forms of communicating global identity in entertaining media formats. Existing examples are games in which the living conditions of people in different countries can be virtually experienced (e.g., Bachen et al., 2012) or films such as the documentary 'On the way to school' by Pascal Plisson that shows children from different cultures in a phase of life that represents a formative experience for most of us. Such efforts may help individuals see that there are more similarities than differences among people in this world.

8. Conclusion

Climate change is a challenge that the world community needs to face collectively. At the same time, it requires individual engagement. In summary, my work contributes to this endeavour by providing evidence for the usefulness of two interconnected strategies of climate change communication. The first strategy consists of *reducing* the psychological socio-spatial distance of climate change by means of proximising the issue in news coverage. The second strategy consists of *bridging* the psychological socio-spatial distance of climate change by communicating connectedness between people all over the world. Moreover, my work provides insights into the role of global identity as an individual trait in the context of climate change communication. From a theoretical perspective, my findings contribute to the conceptualisation of the process behind proximising climate change in communication (Brügger et al., 2016) and to a social identity perspective on climate change (Fritsche et al., 2018). From a societal and practical perspective, they help us understand how communication can be shaped to motivate people’s engagement with climate change. I suggest that future research critically replicate my findings, shed light on the development of psychological socio-spatial distance of climate change over time, and investigate impacts of repeated contact with proximal climate change communication. Moreover, other communicative means of raising the salience of global identity as well as the origins and development of a global identity appear to be worthwhile research topics.

Nennt mich naiv, es ist mir egal, aber ich finde es reicht.
Ich suche das Land, in dem jeder dem andern in Staatsunangehörigkeit gleicht.
Ich melde mich ab, ich will einen Pass, wo „Erdenbewohner“ drin steht.
Einfach nur „Erdenbewohner“. Sagt mir bitte, wohin man da geht.
Ich melde mich ab, ich melde mich um, das kann doch so schwierig nicht sein.
Schreibt einfach nur Erdenbewohner da rein.
(aus „Grenzen“, Dota Kehr, 2016)

References

Adams, R. J., Wilson, M., & Wang, W.-c. (1997). The multidimensional random coefficients multinomial logit model. *Applied Psychological Measurement*, *21*(1), 1–23. https://doi.org/10.1177/0146621697211001

Adler, A. (1927/1954). *Understanding human nature*. (W. B. Wolfe, Trans.; original work published 1927). Greenwich, CT: Fawcett.

Adler, C. E., & Hirsch Hadorn, G. (2014). The IPCC and treatment of uncertainties: Topics and sources of dissensus. *Wiley Interdisciplinary Reviews: Climate Change*, *5*(5), 663–676. https://doi.org/10.1002/wcc.297

Adomßent, M., & Godemann, J. (2011). Sustainability communication: An integrative approach. In J. Godemann & G. Michelsen (Eds.), *Sustainability communication: Interdisciplinary perspectives and theoretical foundation* (pp. 27–37). Dordrecht, New York: Springer.

Ahn, S. J., Fox, J., Dale, K. R., & Avant, J. A. (2015). Framing virtual experiences: Effects on environmental efficacy and behavior over time. *Communication Research*, *42*(6), 839–863. https://doi.org/10.1177/0093650214534973

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Amel, E. L., Manning, C. M., & Scott, B. A. (2009). Mindfulness and sustainable behavior: Pondering attention and awareness as means for increasing green behavior. *Ecopsychology*, *1*(1), 14–25. https://doi.org/10.1089/eco.2008.0005

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

Anderson, A. (2011). Sources, media, and modes of climate change communication: The role of celebrities. *Wiley Interdisciplinary Reviews: Climate Change*, *2*(4), 535–546. https://doi.org/10.1002/wcc.119

Anderson, A. A., & Huntington, H. E. (2017). Social media, science, and attack discourse: How Twitter discussions of climate change use sarcasm and incivility. *Science Communication*, *39*(5), 598–620. https://doi.org/10.1177/1075547017735113

Antilla, L. (2005). Climate of scepticism: US newspaper coverage of the science of climate change. *Global Environmental Change*, *15*(4), 338–352. https://doi.org/10.1016/j.gloenvcha.2005.08.003

Arlt, D., Hoppe, I., & Wolling, J. (2010). Klimawandel und Mediennutzung. Wirkungen auf Problembewusstsein und Handlungsabsichten [Climate change and media use. Impacts on problem awareness and behavioural intentions]. *M&K Medien & Kommunikationswissenschaft*, *58*(1), 3–25. https://doi.org/10.5771/1615-634x-2010-1-3

Arlt, D., & Wolling, J. (2012). Die Presseberichterstattung über die Weltklimakonferenz in Kopenhagen [News coverage on the world climate summit in Copenhagen]. *SCM Studies in Communication and Media*, *1*(2), 283–297. https://doi.org/10.5771/2192-4007-2012-2-283

Arnocky, S., Stroink, M., & DeCicco, T. (2007). Self-construal predicts environmental concern, cooperation, and conservation. *Journal of Environmental Psychology*, *27*(4), 255–264. https://doi.org/10.1016/j.jenvp.2007.06.005

Arnold, O., Kibbe, A., Hartig, T., & Kaiser, F. G. (2017). Capturing the environmental impact of individual lifestyles: Evidence of the criterion validity of the General Ecological Behavior scale. *Environment & Behavior*, *50*(3), 350–372. https://doi.org/10.1177/0013916517701796

Asplund, T., Hjerpe, M., & Wibeck, V. (2013). Framings and coverage of climate change in Swedish specialized farming magazines. *Climatic Change*, *117*(1/2), 197–209. https://doi.org/10.1007/s10584-012-0535-0

Axelrod, L. J., & Lehman, D. R. (1993). Responding to environmental concerns: What factors guide individual action? *Journal of Environmental Psychology*, *13*(2), 149–159. https://doi.org/10.1016/S0272-4944(05)80147-1

Aykut, S. C., Comby, J.-B., & Guillemot, H. (2012). Climate change controversies in French mass media 1990-2010. *Journalism Studies*, *13*(2), 157–174. https://doi.org/10.1080/1461670X.2011.646395

Bachen, C. M., Hernández-Ramos, P. F., & Raphael, C. (2012). Simulating REAL LIVES: Promoting global empathy and interest in learning through simulation games. *Simulation & Gaming*, *43*(4), 437–460. https://doi.org/10.1177/1046878111432108

Bailey, A., Giangola, L., & Boykoff, M. T. (2014). How grammatical choice shapes media representations of climate (un)certainty. *Environmental Communication*, *8*(2), 197–215. https://doi.org/10.1080/17524032.2014.906481

Bain, P. G., Milfont, T. L., Kashima, Y., Bilewicz, M., Doron, G., Garðarsdóttir, R. B., . . . Saviolidis, N. M. (2015). Co-benefits of addressing climate change can motivate action around the world. *Nature Climate Change*, *6*, 154-157. https://doi.org/10.1038/nclimate2814

Balmford, A., Manica, A., Airey, L., Birkin, L., Oliver, A., & Schleicher, J. (2004). Hollywood, climate change, and the public. *Science*, *305*(5691), 1713. https://doi.org/10.1126/science.305.5691.1713b

Bamberg, S. (2013). Applying the stage model of self-regulated behavioral change in a car use reduction intervention. *Journal of Environmental Psychology*, *33*, 68–75. https://doi.org/10.1016/j.jenvp.2012.10.001

Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology*, *27*(1), 14–25. https://doi.org/10.1016/j.jenvp.2006.12.002

Bandura, A. (2000). Exercise of human agency through collective efficacy. *Current Directions in Psychological Science*, *9*(3), 75–78. https://doi.org/10.1111/1467-8721.00064

Bar-Anan, Y., Liberman, N., & Trope, Y. (2006). The association between psychological distance and construal level: Evidence from an implicit association test. *Journal of Experimental Psychology: General*, *135*(4), 609–622. https://doi.org/10.1037/0096-3445.135.4.609

Barbaro, N., & Pickett, S. M. (2016). Mindfully green: Examining the effect of connectedness to nature on the relationship between mindfulness and engagement in pro-environmental behavior. *Personality and Individual Differences*, *93*, 137–142. https://doi.org/10.1016/j.paid.2015.05.026

Barber, N. A., & Deale, C. (2014). Tapping mindfulness to shape hotel guests' sustainable behavior. *Cornell Hospitality Quarterly*, *55*(1), 100–114. https://doi.org/10.1177/1938965513496315

Barth, M., Jugert, P., Wutzler, M., & Fritsche, I. (2015). Absolute moral standards and global identity as independent predictors of collective action against global injustice. *European Journal of Social Psychology*, *45*(7), 918–930. https://doi.org/10.1002/ejsp.2160

Bashir, N. Y., Wilson, A. E., Lockwood, P., Chasteen, A. L., & Alisat, S. (2014). The time for action is now: Subjective temporal proximity enhances pursuit of remote-future goals. *Social Cognition*, *32*(1), 83–93. https://doi.org/10.1521/soco.2014.32.1.83

Batalha, L., & Reynolds, K. J. (2012). ASPIRing to mitigate climate change: Superordinate identity in global climate negotiations. *Political Psychology*, *33*(5), 743–760. https://doi.org/10.1111/j.1467-9221.2012.00896.x

Bertolotti, M., & Catellani, P. (2014). Effects of message framing in policy communication on climate change. *European Journal of Social Psychology*, *44*(5), 474–486. https://doi.org/10.1002/ejsp.2033

Bertolotti, M., & Catellani, P. (2015). Agreement with climate change policies: Framing the future and national versus supranational identity. *European Journal of Social Psychology*, *45*(7), 847–857. https://doi.org/10.1002/ejsp.2166

Billett, S. (2010). Dividing climate change: Global warming in the Indian mass media. *Climatic Change*, *99*(1/2), 1–16. https://doi.org/10.1007/s10584-009-9605-3

Blasio, E. D., & Sorice, M. (2013). The framing of climate change in Italian politics and its impact on public opinion. *International Journal of Media & Cultural Politics*, *9*(1), 59–69. https://doi.org/10.1386/macp.9.1.59_1

Bliuc, A.-M., McGarty, C., Thomas, E. F., Lala, G., Berndsen, M., & Misajon, R. (2015). Public division about climate change rooted in conflicting socio-political identities. *Nature Climate Change*, *5*(3), 226–229. https://doi.org/10.1038/nclimate2507

Bolderdijk, J. W., Steg, L., Geller, E. S., Lehman, P. K., & Postmes, T. (2012). Comparing the effectiveness of monetary versus moral motives in environmental campaigning. *Nature Climate Change*, *3*, 413-416. https://doi.org/10.1038/nclimate1767

Bond, T. G., & Fox, C. M. (2007). *Applying the Rasch model: Fundamental measurement in the human sciences* (2nd ed.). New York: Routledge.

Bord, R. J., Fisher, A., & O'Connor, R. E. (1998). Public perceptions of global warming: United States and international perspectives. *Climate Research*, *11*(1), 75–84.

Bord, R. J., O'Connor, R. E., & Fisher, A. (2000). In what sense does the public need to understand global climate change? *Public Understanding of Science*, *9*(3), 205–218. Retrieved from http://journals.sagepub.com/doi/abs/10.1088/0963-6625/9/3/301?journalCode=pusa

Bore, I.-L. K., & Reid, G. (2014). Laughing in the face of climate change? Satire as a device for engaging audiences in public debate. *Science Communication*, *36*(4), 454–478. https://doi.org/10.1177/1075547014534076

Bostrom, A., Böhm, G., & O'Connor, R. E. (2013). Targeting and tailoring climate change communications. *Wiley Interdisciplinary Reviews: Climate Change*, *4*(5), 447–455. https://doi.org/10.1002/wcc.234

Boykoff, M. T. (2007). From convergence to contention: United States mass media representations of anthropogenic climate change science. *Transactions of the Institute of British Geographers*, *32*(4), 477–489. https://doi.org/10.1111/j.1475-5661.2007.00270.x

Boykoff, M. T., & Boykoff, J. M. (2004). Balance as bias: Global warming and the US prestige press. *Global Environmental Change*, *14*(2), 125–136. https://doi.org/10.1016/j.gloenvcha.2003.10.001

Braasch, G. (2013). Climate change: Is seeing believing? *Bulletin of the Atomic Scientists*, *69*(6), 33–41. https://doi.org/10.1177/0096340213508628

Bråten, I., Strømsø, H. I., & Salmerón, L. (2011). Trust and mistrust when students read multiple information sources about climate change. *Learning and Instruction*, *21*(2), 180–192. https://doi.org/10.1016/j.learninstruc.2010.02.002

Braungart, M., McDonough, W., & Bollinger, A. (2007). Cradle-to-cradle design: Creating healthy emissions – a strategy for eco-effective product and system design. *Journal of Cleaner Production*, *15*(13-14), 1337–1348. https://doi.org/10.1016/j.jclepro.2006.08.003

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality & Social Psychology*, *84*(4), 822–848. https://doi.org/10.1037/0022-3514.84.4.822

Brüggemann, M., Neverla, I., Hoppe, I., & Walter, S. (2018). Klimawandel in den Medien [Climate change in the media]. In I. Meinke, M. Claußen, & H. v. Storch (Eds.), *Hamburger Klimabericht – Wissen über Klima, Klimawandel und Auswirkungen in Hamburg und Norddeutschland* (pp. 243–254). Berlin, Heidelberg: Springer Spektrum.

Brügger, A., Dessai, S., Devine-Wright, P., Morton, T. A., & Pidgeon, N. F. (2015). Psychological responses to the proximity of climate change. *Nature Climate Change*, *5*(12), 1031–1037. https://doi.org/10.1038/nclimate2760

Brügger, A., Morton, T. A., & Dessai, S. (2015). Hand in hand: Public endorsement of climate change mitigation and adaptation. *PLOS ONE*, *10*(4), 1-17. https://doi.org/10.1371/journal.pone.0124843

Brügger, A., Morton, T. A., & Dessai, S. (2016). "Proximising" climate change reconsidered: A construal level theory perspective. *Journal of Environmental Psychology*, *46*, 125–142. https://doi.org/10.1016/j.jenvp.2016.04.004

Buchan, N. R., Brewer, M. B., Grimalda, G., Wilson, R. K., Fatas, E., & Foddy, M. (2011). Global social identity and global cooperation. *Psychological Science*, *22*(6), 821–828. https://doi.org/10.1177/0956797611409590

Budescu, D. V., Broomell, S. B., & Por, H.-H. (2009). Improving communication of uncertainty in the reports of the Intergovernmental Panel on Climate Change. *Psychological Science*, *20*(3), 299–308. https://doi.org/10.1111/j.1467-9280.2009.02284.x

Busse, M., & Menzel, S. (2014). The role of perceived socio-spatial distance in adolescents' willingness to engage in pro-environmental behavior. *Journal of Environmental Psychology*, *40*, 412–420. https://doi.org/10.1016/j.jenvp.2014.10.002

Canty, A., & Ripley, B. (2017). *boot: Bootstrap functions. R package version 1.3-20*. Retrieved from https://cran.r-project.org/web/packages/boot/boot.pdf

Capstick, S. B., & Pidgeon, N. F. (2014). What is climate change scepticism? Examination of the concept using a mixed methods study of the UK public. *Global Environmental Change*, *24*, 389–401. https://doi.org/10.1016/j.gloenvcha.2013.08.012

Capstick, S. B., Whitmarsh, L., Poortinga, W., Pidgeon, N., & Upham, P. (2015). International trends in public perceptions of climate change over the past quarter century. *Wiley Interdisciplinary Reviews: Climate Change*, *6*(1), 35–61. https://doi.org/10.1002/wcc.321

Carmi, N., & Kimhi, S. (2015). Further than the eye can see: Psychological distance and perception of environmental threats. *Human and Ecological Risk Assessment: an International Journal*, *21*(8), 2239–2257. https://doi.org/10.1080/10807039.2015.1046419

Carvalho, A., & Burgess, J. (2005). Cultural circuits of climate change in U.K. broadsheet newspapers, 1985-2003. *Risk Analysis*, *25*(6), 1457–1469. https://doi.org/10.1111/j.1539-6924.2005.00692.x

Chen, S. X., Lam, Ben C P, Hui, Bryant P H, Ng, Jacky C K, Mak, Winnie W S, Guan, Y., . . . Lau, V. C. Y. (2016). Conceptualizing psychological processes in response to globalization: Components, antecedents, and consequences of global orientations. *Journal of Personality and Social Psychology*, *110*(2), 302–331. https://doi.org/10.1037/a0039647

Chetty, K., Devadas, V., & Fleming, J. S. (2015). The framing of climate change in New Zealand newspapers from June 2009 to June 2010. *Journal of the Royal Society of New Zealand*, *45*(1), 1–20. https://doi.org/10.1080/03036758.2014.996234

Clemens, B., & Hamakawa, C. (2010). Classroom as cinema: Using film to teach sustainability. *Academy of Management Learning & Education*, *9*(3), 561–563. https://doi.org/10.5465/AMLE.2010.53791838

Coe, K., & Neumann, R. (2011). International identity in theory and practice: The case of the modern American presidency. *Communication Monographs*, *78*(2), 139–161. https://doi.org/10.1080/03637751.2011.564641

Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112*(1), 155–159. https://doi.org/10.1037/0033-2909.112.1.155

Committee on Climate Change. (2016). *UK climate change risk assessment 2017 evidence report*. Retrieved from http://www.theccc.org.uk/UK-climate-change-risk-assessment-2017/

Cook, J., Nuccitelli, D., Skuce, A., Jacobs, P., Painting, R., Honeycutt, R., . . . Way, R. G. (2014). Reply to 'Quantifying the consensus on anthropogenic global warming in the scientific literature: A re-analysis'. *Energy Policy*, *73*, 706–708. https://doi.org/10.1016/j.enpol.2014.06.002

Corner, A., & Clarke, J. (2017). *Talking climate: From research to practice in public engagement*. Cham: Palgrave Macmillan.

Corner, A., Markowitz, E. M., & Pidgeon, N. (2014). Public engagement with climate change: The role of human values. *Wiley Interdisciplinary Reviews: Climate Change*, *5*(3), 411–422. https://doi.org/10.1002/wcc.269

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, *16*(3), 297–334. https://doi.org/10.1007/BF02310555

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01

Der-Karabetian, A., Cao, Y., & Alfaro, M. (2014). Sustainable behavior, perceived globalization impact, world-mindedness, identity, and perceived risk in college samples from the United States, China, and Taiwan. *Ecopsychology*, *6*(4), 218–233. https://doi.org/10.1089/eco.2014.0035

Devine-Wright, P., Price, J., & Leviston, Z. (2015). My country or my planet? Exploring the influence of multiple place attachments and ideological beliefs upon climate change attitudes and opinions. *Global Environmental Change*, *30*, 68–79. https://doi.org/10.1016/j.gloenvcha.2014.10.012

Díaz-Siefer, P., Neaman, A., Salgado, E., Celis-Diez, J., & Otto, S. (2015). Human-environment system knowledge: A correlate of pro-environmental behavior. *Sustainability*, *7*(12), 15510–15526. https://doi.org/10.3390/su71115510

Dijkstra, E. M., & Goedhart, M. J. (2012). Development and validation of the ACSI: Measuring students' science attitudes, pro-environmental behaviour, climate change attitudes and knowledge. *Environmental Education Research*, *18*(6), 733–749. https://doi.org/10.1080/13504622.2012.662213

Ding, D., Maibach, E. W., Zhao, X., Roser-Renouf, C., & Leiserowitz, A. A. (2011). Support for climate policy and societal action are linked to perceptions about scientific agreement. *Nature Climate Change*, *1*(9), 462–466. https://doi.org/10.1038/nclimate1295

Doran, P. T., & Zimmerman, M. K. (2009). Examining the scientific consensus on climate change. *Eos, Transactions American Geophysical Union*, *90*(3), 22–23. https://doi.org/10.1029/2009EO030002

Dovidio, J. F., Gaertner, S. L., & Saguy, T. (2009). Commonality and the complexity of "we": Social attitudes and social change. *Personality and Social Psychology Review*, *13*(1), 3–20. https://doi.org/10.1177/1088868308326751

Drews, S., & van den Bergh, J. C. J. M. (2015). What explains public support for climate policies?: A review of empirical and experimental studies. *Climate Policy*, *16*(7), 855–876. https://doi.org/10.1080/14693062.2015.1058240

Eilders, C. (2006). News factors and news decisions. Theoretical and methodological advances in Germany. *Communications*, *31*(1), 5–24. https://doi.org/10.1515/COMMUN.2006.002

Eisinga, R., Grotenhuis, M. t., & Pelzer, B. (2013). The reliability of a two-item scale: Pearson, Cronbach, or Spearman-Brown? *International Journal of Public Health*, *58*(4), 637–642. https://doi.org/10.1007/s00038-012-0416-3

Entman, R. M., Matthes, J., & Pellicano, L. (2009). Nature, sources, and effects of news framing. In K. Wahl-Jorgensen & T. Hanitzsch (Eds.), *The handbook of journalism studies* (pp. 175–190). New York, NY: Routledge.

Eveland, W. P. J. (2001). The cognitive mediation model of learning from the news: Evidence from nonelection, off-year election, and presidential election contexts. *Communication Research*, *28*(5), 571–601. https://doi.org/10.1177/009365001028005001

Eveland, W. P. J., & Hively, M. H. (2008). Political knowledge. In Wolfgang Donsbach (Ed.), *The international encyclopedia of communication* (pp. 3715–3719). Malden, MA: Wiley-Blackwell.

Eveland, W. P. J., & Schmitt, J. B. (2015). Communication content and knowledge content matters: Integrating manipulation and observation in studying news and discussion learning effects. *Journal of Communication*, *65*(1), 170–191. https://doi.org/10.1111/jcom.12138

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175–191. https://doi.org/10.3758/BF03193146

Faulkner, N. (2018). “Put yourself in their shoes”: Testing empathy's ability to motivate cosmopolitan behavior. *Political Psychology*, *39*(1), 217–228. https://doi.org/10.1111/pops.12411

Feldman, L., & Hart, P. S. (2015). Using political efficacy messages to increase climate activism: The mediating role of emotions. *Science Communication*, *38*(1), 99–127. https://doi.org/10.1177/1075547015617941

Feldman, L., & Hart, P. S. (2018). Is there any hope? How climate change news imagery and text influence audience emotions and support for climate mitigation policies. *Risk Analysis*, *38*(3), 585–602. https://doi.org/10.1111/risa.12868

Ferguson, M. A., McDonald, R. I., & Branscombe, N. R. (2016). Global climate change: A social identity perspective on informational and structural interventions. In N. Ferguson, R. Haji, & S. McKeown (Eds.), *Peace psychology book series. Understanding peace and conflict through social identity theory: Contemporary global perspectives* (pp. 145–164). Switzerland: Springer. https://doi.org/10.1007/978-3-319-29869-6_10

Field, A., Miles, J., & Field, Z. (2012). *Discovering statistics using R*. London: Sage Publications.

Fletcher, T. D. (2015). *QuantPsyc: Quantitative psychology tools. R package version 1.5*. Retrieved from https://cran.r-project.org/web/packages/QuantPsyc/QuantPsyc.pdf

Fleury-Bahi, G. (2008). Environmental risk: Perception and target with local versus global evaluation. *Psychological Reports*, *102*(1), 185–193. Retrieved from 10.2466/PR0.102.1.185-193

Fløttum, K., Gjesdal, A. M., Gjerstad, Ø., Koteyko, N., & Salway, A. (2014). Representations of the future in English language blogs on climate change. *Global Environmental Change*, *29*(0), 213–222. https://doi.org/10.1016/j.gloenvcha.2014.10.005

Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. *Journal of Marketing Research*, *18*(3), 382. https://doi.org/10.2307/3150980

Fox, J., Weisberg, S., & Price, B. (2018). *car: companion to applied regression. R package version 3.0-0*. Retrieved from https://cran.r-project.org/web/packages/car/car.pdf

Frick, J., Kaiser, F. G., & Wilson, M. (2004). Environmental knowledge and conservation behavior: Exploring prevalence and structure in a representative sample. *Personality and Individual Differences*, *37*, 1597–1613. https://doi.org/10.1016/j.paid.2004.02.015

Fritsche, I., Barth, M., Jugert, P., Masson, T., & Reese, G. (2018). A social identity model of pro-environmental action (SIMPEA). *Psychological Review*, *125*(2), 245–269. https://doi.org/10.1037/rev0000090

Gaertner, S. L., & Dovidio, J. F. (2000). *Reducing intergroup bias: The common ingroup identity model*. Philadelphia: Psychology Press.

Galston, W. A. (2001). Political knowledge, political engagement, and civic education. *Annual Review of Political Science*, *4*(1), 217–234. https://doi.org/10.1146/annurev.polisci.4.1.217

Galtung, J., & Ruge, M. H. (1965). The structure of foreign news: The presentation of the Congo, Cuba and Cyprus crises in four Norwegian newspapers. *Journal of Peace Research*, *2*(1), 64–90. https://doi.org/10.1177/002234336500200104

Gatersleben, B., Steg, L., & Vlek, C. (2002). Measurement and determinants of environmentally significant consumer behavior. *Environment and Behavior*, *34*(3), 335–362. https://doi.org/10.1177/0013916502034003004

Geiger, S. M., Otto, S., & Diaz-Marin, J. S. (2014). A diagnostic environmental knowledge scale for Latin America/Escala diagnóstica de conocimientos ambientales para Latinoamérica. *Psyecology*, *5*(1), 1–36. https://doi.org/10.1080/21711976.2014.881664

Geiger, S. M., Otto, S., & Schrader, U. (2018). Mindfully green and healthy: An indirect path from mindfulness to ecological behavior. *Frontiers in Psychology*, *8*, 14. https://doi.org/10.3389/fpsyg.2017.02306

Gerstengarbe, F.-W., & Welzer, H. (Eds.). (2013). *Zwei Grad mehr in Deutschland: Wie der Klimawandel unseren Alltag verändern wird* [Two degrees more in Germany: How climate change will change our daily lives]. Frankfurt: Fischer.

Gifford, R., & Comeau, L. A. (2011). Message framing influences perceived climate change competence, engagement, and behavioral intentions. *Global Environmental Change*, *21*(4), 1301–1307. https://doi.org/10.1016/j.gloenvcha.2011.06.004

Göckeritz, S., Schultz, P. W., Rendón, T., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2010). Descriptive normative beliefs and conservation behavior: The moderating roles of personal involvement and injunctive normative beliefs. *European Journal of Social Psychology*, *40*(3), 514-523. https://doi.org/10.1002/ejsp.643

Godemann, J., & Michelsen, G. (2011a). Sustainability communication - An introduction. In J. Godemann & G. Michelsen (Eds.), *Sustainability communication: Interdisciplinary perspectives and theoretical foundation* (pp. 3–11). Dordrecht, New York: Springer.

Godemann, J., & Michelsen, G. (Eds.). (2011b). *Sustainability communication: Interdisciplinary perspectives and theoretical foundation*. Dordrecht, New York: Springer.

Gonzalez-Estrada, E., & Villasenor-Alva, J. A. (2013). *mvShapiroTest: generalized Shapiro-Wilk test for multivariate normality. R package version 1.0*. Retrieved from https://cran.r-project.org/web/packages/mvShapiroTest/mvShapiroTest.pdf

Greitemeyer, T. (2013). Beware of climate change skeptic films. *Journal of Environmental Psychology*, *35*, 105–109. https://doi.org/10.1016/j.jenvp.2013.06.002

Griskevicius, V., Tybur, J. M., & van den Bergh, B. (2010). Going green to be seen: Status, reputation, and conspicuous conservation. *Journal of Personality & Social Psychology*, *98*(3), 392–404. https://doi.org/10.1037/a0017346

Gruber, T. (2011). *Gedächtnis* [Memory]. Wiesbaden: VS Verlag für Sozialwissenschaften.

Gutiérrez-Pérez, J. (2014). Latin American narratives of sustainability: Opportunities for engagement through films. *International Journal of Sustainable Development*, *17*(2), 160. https://doi.org/10.1504/IJSD.2014.061790

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (1998). *Multivariate data analysis* (4th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Happer, C., & Philo, G. (2016). New approaches to understanding the role of the news media in the formation of public attitudes and behaviours on climate change. *European Journal of Communication*, *31*(2), 136–151. https://doi.org/10.1177/0267323115612213

Hart, P. S. (2011). One or many? The influence of episodic and thematic climate change frames on policy preferences and individual behavior change. *Science Communication*, *33*(1), 28–51. https://doi.org/10.1177/1075547010366400

Hart, P. S. (2013). The role of numeracy in moderating the influence of statistics in climate change messages. *Public Understanding of Science*, *22*(7), 785–798. https://doi.org/10.1177/0963662513482268

Hart, P. S., & Feldman, L. (2016). The impact of climate change–related imagery and text on public opinion and behavior change. *Science Communication*, *38*(4), 415–441. https://doi.org/10.1177/1075547016655357

Hart, P. S., & Nisbet, E. C. (2012). Boomerang effects in science communication: How motivated reasoning and identity cues amplify opinion polarization about climate mitigation policies. *Communication Research*, *39*(6), 701–723. https://doi.org/10.1177/0093650211416646

Hart, P. S., Nisbet, E. C., & Myers, T. A. (2015). Public attention to science and political news and support for climate change mitigation. *Nature Climate Change*, *5*(6), 541–545. Retrieved from http://dx.doi.org/10.1038/nclimate2577

Hart, P. S., Stedman, R. C., & McComas, K. A. (2015). How the physical proximity of climate mitigation projects influences the relationship between affect and public support. *Journal of Environmental Psychology*, *43*, 196–202. https://doi.org/10.1016/j.jenvp.2015.07.003

Hauser, O. P., Rand, D. G., Peysakhovich, A., & Nowak, M. A. (2014). Cooperating with the future. *Nature*, *511*(7508), 220–223. https://doi.org/10.1038/nature13530

Hayes, A. F., & Scharkow, M. (2013). The relative trustworthiness of inferential tests of the indirect effect in statistical mediation analysis: Does method really matter? *Psychological Science*, *24*(10), 1918–1927. https://doi.org/10.1177/0956797613480187

Henderson, M. D., Fujita, K., Trope, Y., & Liberman, N. (2006). Transcending the "here": The effect of spatial distance on social judgment. *Journal of Personality and Social Psychology*, *91*(5), 845–856. https://doi.org/10.1037/0022-3514.91.5.845

Henderson, M. D., Wakslak, C. J., Fujita, K., & Rohrbach, J. (2011). Construal level theory and spatial distance. *Social Psychology*, *42*(3), 165–173. https://doi.org/10.1027/1864-9335/a000060

Hine, D. W., Reser, J. P., Morrison, M., Phillips, W. J., Nunn, P., & Cooksey, R. (2014). Audience segmentation and climate change communication: Conceptual and methodological considerations. *Wiley Interdisciplinary Reviews: Climate Change*, *5*(4), 441–459. https://doi.org/10.1002/wcc.279

Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1987). Analysis and synthesis of research on responsible environmental behavior: A meta-analysis. *The Journal of Environmental Education*, *18*(2), 1–8. https://doi.org/10.1080/00958964.1987.9943482

Holbrook, A. L., Berent, M. K., Krosnick, J. A., Visser, P. S., & Boninger, D. S. (2005). Attitude importance and the accumulation of attitude-relevant knowledge in memory. *Journal of Personality and Social Psychology*, *88*(5), 749–769. https://doi.org/10.1037/0022-3514.88.5.749

Houghton, J. T., Ding, Y., Griggs, D. J., Noguer, M., van der Linden, P. J., Dai, X., . . . Johnson, C. A. (Eds.). (2001). *Climate change 2001: The scientific basis. Contribution of working group 1 to the third assessment report of the Intergovernmental Panel on Climate Change*. Cambridge, UK, and N.Y., USA.: Cambridge University Press.

Howell, R. A. (2011). Lights, camera … action? Altered attitudes and behaviour in response to the climate change film The Age of Stupid. *Global Environmental Change*, *21*(1), 177–187. https://doi.org/10.1016/j.gloenvcha.2010.09.004

Howell, R. A. (2014). Investigating the long-term impacts of climate change communications on individuals' attitudes and behavior. *Environment and Behavior*, *46*(1), 70–101. https://doi.org/10.1177/0013916512452428

Hu, L.-t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: a Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Hutcherson, C. A., Seppala, E. M., & Gross, J. J. (2008). Loving-kindness meditation increases social connectedness. *Emotion*, *8*(5), 720–724. https://doi.org/10.1037/a0013237

IPCC. (2007). *Climate change 2007: Synthesis report*. Retrieved from Intergovernmental Panel on Climate Change website: http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf

IPCC. (2010). *Understanding climate change: 22 years of IPCC assessment*. Retrieved from Intergovernmental Panel on Climate Change website: https://www.ipcc.ch/pdf/press/ipcc_leaflets_2010/ipcc-brochure_understanding.pdf

IPCC. (2014). *Climate change 2014: Synthesis report: Contribution of working groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [core writing team, R.K.*

Pachauri and L.A. Meyer (eds.)]. Retrieved from Intergovernmental Panel on Climate Change website: https://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_All_Topics.pdf

Ivanova, A., Schäfer, M. S., Schlichting, I., & Schmidt, A. (2013). Is there a medialization of climate science? Results from a survey of German climate scientists. *Science Communication*, *35*(5), 626–653. https://doi.org/10.1177/1075547012475226

Iyengar, S. (1991). *Is anyone responsible? How television frames political issues*. Chicago: University of Chicago Press.

Jackson, D. L. (2003). Revisiting sample size and number of parameter estimates: Some support for the N:q hypothesis. *Structural Equation Modeling: a Multidisciplinary Journal*, *10*(1), 128–141. https://doi.org/10.1207/S15328007SEM1001_6

Jacob, J., Jovic, E., & Brinkerhoff, M. B. (2009). Personal and planetary well-being: Mindfulness meditation, pro-environmental behavior and personal quality of life in a survey from the social justice and ecological sustainability movement. *Social Indicators Research*, *93*(2), 275–294. https://doi.org/10.1007/s11205-008-9308-6

Jang, S. M., & Hart, P. S. (2015). Polarized frames on "climate change" and "global warming" across countries and states: Evidence from Twitter big data. *Global Environmental Change*, *32*(0), 11–17. https://doi.org/10.1016/j.gloenvcha.2015.02.010

Jones, C., Hine, D. W., & Marks, A. D. G. (2017). The future is now: Reducing psychological distance to increase public engagement with climate change. *Risk Analysis*, *37*(2), 331-341. https://doi.org/10.1111/risa.12601

Jugert, P., Greenaway, K. H., Barth, M., Büchner, R., Eisentraut, S., & Fritsche, I. (2016). Collective efficacy increases pro-environmental intentions through increasing self-efficacy. *Journal of Environmental Psychology*, *48*, 12–23. https://doi.org/10.1016/j.jenvp.2016.08.003

Just, M. A., & Brownell, H. H. (1974). Retrieval of concrete and abstract prose descriptions from memory. *Canadian Journal of Psychology/Revue Canadienne De Psychologie*, *28*(3), 339–350. https://doi.org/10.1037/h0082000

Kabat-Zinn, J. (1994). *Wherever you go there you are: Mindfulness meditation in everyday life*. New York, NY: Hyperion.

Kahlor, L., & Rosenthal, S. (2009). If we seek, do we learn?: Predicting knowledge of global warming. *Science Communication*, *30*(3), 380–414. https://doi.org/10.1177/1075547008328798

Kaiser, F. G. (1998). A general measure of ecological behavior. *Journal of Applied Social Psychology*, *28*(5), 395–422. https://doi.org/10.1111/j.1559-1816.1998.tb01712.x

Kaiser, F. G., Byrka, K., & Hartig, T. (2010). Reviving Campbell's paradigm for attitude research. *Personality & Social Psychology Review*, *14*(4), 351–367. https://doi.org/10.1177/1088868310366452

Kaiser, F. G., Doka, G., Hofstetter, P., & Ranney, M. A. (2003). Ecological behavior and its environmental consequences: A life cycle assessment of a self-report measure. *Journal of Environmental Psychology*, *23*(1), 11–20. https://doi.org/10.1016/S0272-4944(02)00075-0

Kaiser, F. G., & Frick, J. (2002). Entwicklung eines Messinstrumentes zur Erfassung von Umweltwissen auf der Basis des MRCML-Modells [Development of a measure to assess environmental knowledge on the basis of the MRCML model]. *Diagnostica*, *48*(4), 181–189. https://doi.org/10.1026//0012-1924.48.4.181

Kaiser, F. G., Frick, J., & Stoll-Kleemann, S. (2001). Zur Angemessenheit selbstberichteten Verhaltens: Eine Validitätsuntersuchung der Skala Allgemeinen Ökologischen Verhaltens [Accuracy of self-reports: Validating the General Ecological Behavior scale]. *Diagnostica*, *47*(2), 88–95. https://doi.org/10.1026//0012-1924.47.2.88

Kaiser, F. G., & Fuhrer, U. (2003). Ecological behavior's dependency on different forms of knowledge. *Applied Psychology: an International Review*, *52*(4), 598–613. https://doi.org/10.1111/%28ISSN%291464-0597;

Kaiser, F. G., Roczen, N., & Bogner, F. X. (2008). Competence formation in environmental education: Advancing ecology-specific rather than general abilities. *Umweltpsychologie*, *12*(2), 56–70.

Kaiser, F. G., & Wilson, M. (2000). Assessing people's general ecological behavior: A cross-cultural measure. *Journal of Applied Social Psychology*, *30*(5), 952–978. https://doi.org/10.1111/j.1559-1816.2000.tb02505.x

Kaiser, F. G., & Wilson, M. (2004). Goal-directed conservation behavior: The specific composition of a general performance. *Personality and Individual Differences*, *36*(7), 1531–1544. https://doi.org/10.1016/j.paid.2003.06.003

Katzarska-Miller, I., Reysen, S., Kamble, S. V., & Vithoji, N. (2012). Cross-national differences in global citizenship: Comparison of Bulgaria, India, and the United States. *Journal of Globalization Studies*, *3*(2), 166–183.

Kehr, D. (2016). *Keine Gefahr*: Kleingeldprinzessin Records.

Kellstedt, P. M., Zahran, S., & Vedlitz, A. (2008). Personal efficacy, the information environment, and attitudes toward global warming and climate change in the United States. *Risk Analysis*, *28*(1), 113–126. https://doi.org/10.1111/j.1539-6924.2008.01010.x

Kim, Y. M. (2008). Where is my issue? The influence of news coverage and personal issue importance on subsequent information selection on the Web. *Journal of Broadcasting & Electronic Media*, *52*(4), 600–621. https://doi.org/10.1080/08838150802437438

Kirk, R. E. (1996). Practical significance: A concept whose time has come. *Educational and Psychological Measurement*, *56*(5), 746–759. https://doi.org/10.1177/0013164496056005002

Kirsner, A. E. (2011). Does a small world lead to a big heart? The effects of connectedness on altruism and intergroup bias (Bachelor thesis). Cornell University.

Kitzmann, S. (2015). Der Einfluss von Medien-Priming auf das prosoziale Verhalten im Umgang mit Flüchtlingen [The influence of media priming on prosocial behaviour towards refugees] (Bachelor thesis). University of Hohenheim, Stuttgart.

Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). New York, NY: Guilford Press.

Knobloch, S., Zillmann, D., Gibson, R., & Karrh, J. A. (2002). Effects of salient news items on information acquisition and issue perception. *Zeitschrift Für Medienpsychologie*, *14*(1), 14–22. https://doi.org/10.1026//1617-6383.14.1.14

Kolandai-Matchett, K. (2009). Mediated communication of ‘sustainable consumption’ in the alternative media: A case study exploring a message framing strategy. *International Journal of Consumer Studies*, *33*(2), 113–125. https://doi.org/10.1111/j.1470-6431.2009.00754.x

Koletsou, A., & Mancy, R. (2011). Which efficacy constructs for large-scale social dilemma problems? Individual and collective forms of efficacy and outcome expectancies in the context of climate change mitigation. *Risk Management*, *13*(4), 184–208. https://doi.org/10.1057/rm.2011.12

Kormos, C., & Gifford, R. (2014). The validity of self-report measures of proenvironmental behavior: A meta-analytic review. *Journal of Environmental Psychology*, *40*, 359–371. https://doi.org/10.1016/j.jenvp.2014.09.003

Kortenkamp, K. V., & Moore, C. F. (2006). Time, uncertainty, and individual differences in decisions to cooperate in resource dilemmas. *Personality and Social Psychology Bulletin*, *32*(5), 603–615. https://doi.org/10.1177/0146167205284006

Koteyko, N., Nerlich, B., & Hellsten, I. (2015). Climate change communication and the Internet: Challenges and opportunities for research. *Environmental Communication*, *9*(2), 149–152. https://doi.org/10.1080/17524032.2015.1029297

Krämer, N., Eimler, S. C., Neubaum, G., Winter, S., Rösner, L., & Oliver, M. B. (2017). Broadcasting one world: How watching online videos can elicit elevation and reduce stereotypes. *New Media & Society*, *19*(9), 1349–1368. https://doi.org/10.1177/1461444816639963

Krosnick, J. A., Holbrook, A. L., Lowe, L., & Visser, P. S. (2006). The origins and consequences of democratic citizens' policy agendas: A study of popular concern about global warming. *Climatic Change*, *77*(1), 7–43. https://doi.org/10.1007/s10584-006-9068-8

Krüger, T., Fiedler, K., Koch, A. S., & Alves, H. (2014). Response category width as a psychophysical manifestation of construal level and distance. *Personality and Social Psychology Bulletin*, *40*(4), 501–512. https://doi.org/10.1177/0146167213517009

Lazard, A., & Atkinson, L. (2014). Putting environmental infographics center stage: The role of visuals at the elaboration likelihood model's critical point of persuasion. *Science Communication*, *37*(1), 6–33. https://doi.org/10.1177/1075547014555997

Leach, C. W., van Zomeren, M., Zebel, S., Vliek, M. L. W., Pennekamp, S. F., Doosje, B., . . . Spears, R. (2008). Group-level self-definition and self-investment: A hierarchical (multicomponent) model of in-group identification. *Journal of Personality and Social Psychology*, *95*(1), 144–165. https://doi.org/10.1037/0022-3514.95.1.144

Lecheler, S., Keer, M., Schuck, A. R.T., & Hänggli, R. (2015). The effects of repetitive news framing on political opinions over time. *Communication Monographs*, *82*(3), 339–358. https://doi.org/10.1080/03637751.2014.994646

Ledgerwood, A., Trope, Y., & Chaiken, S. (2010). Flexibility now, consistency later: Psychological distance and construal shape evaluative responding. *Journal of Personality and Social Psychology*, *99*(1), 32–51. https://doi.org/10.1037/a0019843

Lee, K., Ashton, M. C., Choi, J., & Zachariassen, K. (2015). Connectedness to nature and to humanity: Their association and personality correlates. *Frontiers in Psychology*, *6*(1003), 1–11. https://doi.org/10.3389/fpsyg.2015.01003

Leiner, D. J. (2013). *Too fast, too straight, too weird: Post hoc identification of meaningless data in internet surveys*. Ludwig-Maximilian-University Munich. Retrieved from https://www.researchgate.net/publication/258997762_Too_Fast_Too_Straight_Too_Weird_Post_Hoc_Identification_of_Meaningless_Data_in_Internet_Surveys

Leiserowitz, A. A. (2004). Before and after the day after tomorrow: A U.S. study of climate change risk perception. *Environment: Science and Policy for Sustainable Development*, *46*(9), 22–37. https://doi.org/10.1080/00139150409603663

Leiserowitz, A. A. (2007). Communicating the risks of global warming: American risk perceptions, affective images, and interpretive communities. In S. C. Moser & L. Dilling (Eds.), *Creating a climate for change: Communicating climate change and facilitating social change* (pp. 44–63). New York, NY: Cambridge University Press.

Leiserowitz, A. A., Maibach, E. W., Roser-Renouf, C., & Smith, N. (2010). *Climate change in the American mind: Americans' global warming beliefs and attitudes in June 2010*. New Haven, CT: Yale project on climate change communication. Retrieved from http://environment.yale.edu/climate-communication-OFF/files/ClimateBeliefsJune2010.pdf

Leung, A. K. -Y., Koh, K., & Tam, K.-P. (2015). Being environmentally responsible: Cosmopolitan orientation predicts pro-environmental behaviors. *Journal of Environmental Psychology*, *43*, 79–94. https://doi.org/10.1016/j.jenvp.2015.05.011

Levin, I. P., Schneider, S. L., & Gaeth, G. J. (1998). All frames are not created equal: A typology and critical analysis of framing effects. *Organizational Behavior and Human Decision Processes*, *76*(2), 149–188. https://doi.org/10.1006/obhd.1998.2804

Leviston, Z., Price, J., & Bishop, B. (2014). Imagining climate change: The role of implicit associations and affective psychological distancing in climate change responses. *European Journal of Social Psychology*, *44*(5), 441–454. https://doi.org/10.1002/ejsp.2050

Lewandowsky, S., Oreskes, N., Risbey, J. S., Newell, B. R., & Smithson, M. (2015). Seepage: Climate change denial and its effect on the scientific community. *Global Environmental Change*, *33*(0), 1–13. https://doi.org/10.1016/j.gloenvcha.2015.02.013

Lewis, N. A., & Oyserman, D. (2015). When does the future begin? Time metrics matter, connecting present and future selves. *Psychological Science*, *26*(6), 816–825. https://doi.org/10.1177/0956797615572231

Liberman, N., & Trope, Y. (2008). The psychology of transcending the here and now. *Science*, *322*(5905), 1201–1205. https://doi.org/10.1126/science.1161958

Lin, S.-J. (2013). Perceived impact of a documentary film: An investigation of the first-person effect and its implications for environmental issues. *Science Communication*, *35*(6), 708–733. https://doi.org/10.1177/1075547013478204

Lindenberg, S., & Steg, L. (2007). Normative, gain and hedonic goal frames guiding environmental behavior. *Journal of Social Issues*, *63*(1), 117–137. https://doi.org/10.1111/j.1540-4560.2007.00499.x

Lindner, E. (2012). Fostering global citizenship. In P. T. Coleman & M. Deutsch (Eds.), *Peace psychology book series. Psychological components of sustainable peace* (pp. 283–298). New York, NY US: Springer.

Lindwall, M., Barkoukis, V., Grano, C., Lucidi, F., Raudsepp, L., Liukkonen, J., & Thøgersen-Ntoumani, C. (2012). Method effects: The problem with negatively versus positively keyed items. *Journal of Personality Assessment*, *94*(2), 196–204. https://doi.org/10.1080/00223891.2011.645936

Löfgren, Å., & Nordblom, K. (2009). Attitudes towards CO2 taxation – is there an Al Gore effect? *Applied Economics Letters*, *17*(9), 845–848. https://doi.org/10.1080/13504850802584849

Longoni, C., Gollwitzer, P. M., & Oettingen, G. (2014). A green paradox: Validating green choices has ironic effects on behavior, cognition, and perception. *Journal of Experimental Social Psychology*, *50*(0), 158–165. https://doi.org/10.1016/j.jesp.2013.09.010

Lorenzoni, I., Nicholson-Cole, S., & Whitmarsh, L. (2007). Barriers perceived to engaging with climate change among the UK public and their policy implications. *Global Environmental Change*, *17*(3–4), 445–459. https://doi.org/10.1016/j.gloenvcha.2007.01.004

Lorenzoni, I., & Pidgeon, N. (2006). Public views on climate change: European and USA perspectives. *Climatic Change*, *77*(1-2), 73–95. https://doi.org/10.1007/s10584-006-9072-z

Lowe, T., Brown, K., Dessai, S., de França Doria, Miguel, Haynes, K., & Vincent, K. (2006). Does tomorrow ever come? Disaster narrative and public perceptions of climate change. *Public Understanding of Science*, *15*(4), 435–457. https://doi.org/10.1177/0963662506063796

Lu, H., & Schuldt, J. P. (2016). Compassion for climate change victims and support for mitigation policy. *Journal of Environmental Psychology*, *45*, 192–200. https://doi.org/10.1016/j.jenvp.2016.01.007

Luskin, R. C., & Bullock, J. G. (2011). “Don’t know” means “don’t know”: DK responses and the public’s level of political knowledge. *The Journal of Politics*, *73*(2), 547–557. https://doi.org/10.1017/S0022381611000132

Maibach, E. W., Myers, T. A., & Leiserowitz, A. A. (2014). Climate scientists need to set the record straight: There is a scientific consensus that human-caused climate change is happening. *Earth's Future*, *2*(5), 295–298. https://doi.org/10.1002/2013EF000226

Mair, P., Hatzinger, R., & Maier, M. J. (2018). *Extended Rasch modeling: The R package eRm*. Retrieved from https://cran.r-project.org/web/packages/eRm/vignettes/eRm.pdf

Mair, P., Hatzinger, R., Maier, M. J., & Rusch, T. (2018). *eRm: extended Rasch modeling. R package version 0.16-0.* Retrieved from https://cran.r-project.org/web/packages/eRm/eRm.pdf

Markowitz, E. M., & Shariff, A. F. (2012). Climate change and moral judgement. *Nature Climate Change*, *2*, 243-247. https://doi.org/10.1038/nclimate1378

Maslow, A. H. (1954). *Motivation and personality*. New York, NY US: Harper & Row.

Matthes, J. (2014). *Framing*. Baden Baden: Nomos.

Matthews, P. (2015). Why are people skeptical about climate change? Some insights from blog comments. *Environmental Communication*, *9*(2), 153–168. https://doi.org/10.1080/17524032.2014.999694

Maurer, M. (2011). Wie Journalisten mit Ungewissheit umgehen. Eine Untersuchung am Beispiel der Berichterstattung über die Folgen des Klimawandels [How journalists deal with uncertainty: An exemplary examination of media coverage on the consequences of climate change]. *Medien & Kommunikationswissenschaft*, *59*(1), 60–74. https://doi.org/10.5771/1615-634x-2011-1-60

McCright, A. M. (2010). The effects of gender on climate change knowledge and concern in the American public. *Population and Environment*, *32*(1), 66–87. https://doi.org/10.1007/s11111-010-0113-1

McDonald, R. I., Chai, H. Y., & Newell, B. R. (2015). Personal experience and the 'psychological distance' of climate change: An integrative review. *Journal of Environmental Psychology*, *44*, 109–118. https://doi.org/10.1016/j.jenvp.2015.10.003

McFarland, S. (2011). The slow creation of humanity. *Political Psychology*, *32*(1), 1–20. https://doi.org/10.1111/j.1467-9221.2010.00801.x

McFarland, S., Brown, D., & Webb, M. (2013). Identification with all humanity as a moral concept and psychological construct. *Current Directions in Psychological Science*, *22*(3), 194–198. https://doi.org/10.1177/0963721412471346

McFarland, S., Webb, M., & Brown, D. (2012). All humanity is my ingroup: A measure and studies of identification with all humanity. *Journal of Personality and Social Psychology*, *103*(5), 830–853. https://doi.org/10.1037/a0028724

Meadows, D. H., Meadows, D. L., Randers, J., & Behrens, W. W. (1972). *The limits to growth: A report for the Club of Rome's project on the predicament of mankind*. New York: Universe Books.

Meijnders, A. L., Midden, C. J. H., & Wilke, H. A. M. (2001). Role of negative emotion in communication about CO2 risks. *Risk Analysis*, *21*(5), 955–966. https://doi.org/10.1111/0272-4332.215164

Mercado, M. T. (2012). Media representations of climate change in the Argentinian press. *Journalism Studies*, *13*(2), 193–209. https://doi.org/10.1080/1461670X.2011.646397

Met Office. (2011a). *Climate: Observations, projections and impacts: Bangladesh*. Retrieved from https://www.metoffice.gov.uk/binaries/content/assets/mohippo/pdf/1/q/bangladesh.pdf

Met Office. (2011b). *Climate: Observations, projections and impacts: United Kingdom*. Retrieved from https://www.metoffice.gov.uk/binaries/content/assets/mohippo/pdf/t/r/uk.pdf

Milfont, T. L. (2010). Global warming, climate change and human psychology. In V. Corral-Verdugo, C. H. Garcia Cadena, & M. Frías-Arment (Eds.), *Psychological approaches to sustainability: Current research trends in theory, research and practice* (pp. 19–42). New York: Nova Science Publishers.

Milfont, T. L. (2012). The interplay between knowledge, perceived efficacy, and concern about global warming and climate change: A one-year longitudinal study. *Risk Analysis*, *32*(6), 1003–1020. https://doi.org/10.1111/j.1539-6924.2012.01800.x

Milfont, T. L., Evans, L., Sibley, C. G., Ries, J., & Cunningham, A. (2014). Proximity to coast is linked to climate change belief. *PloS One*, *9*(7), 1-8. https://doi.org/10.1371/journal.pone.0103180

Milinski, M., Semmann, D., Krambeck, H.-J., & Marotzke, J. (2006). Stabilizing the Earth's climate is not a losing game: Supporting evidence from public goods experiments. *Proceedings of the National Academy of Sciences of the United States of America*, *103*(11), 3994–3998. https://doi.org/10.1073/pnas.0504902103

Milinski, M., Sommerfeld, R. D., Krambeck, H.-J., Reed, F. A., & Marotzke, J. (2008). The collective-risk social dilemma and the prevention of simulated dangerous climate change. *Proceedings of the National Academy of Sciences*, *105*(7), 2291–2294. https://doi.org/10.1073/pnas.0709546105

Mir, H. M., Behrang, K., Isaai, M. T., & Nejat, P. (2016). The impact of outcome framing and psychological distance of air pollution consequences on transportation mode choice. *Transportation Research Part D: Transport and Environment*, *46*, 328–338. https://doi.org/10.1016/j.trd.2016.04.012

Mobley, C., Vagias, W. M., & DeWard, S. L. (2010). Exploring additional determinants of environmentally responsible behavior: The influence of environmental literature and environmental attitudes. *Environment and Behavior*, *42*(4), 420–447. https://doi.org/10.1177/0013916508325002

Mondak, J. J., & Anderson, M. R. (2004). The knowledge gap: A reexamination of gender-based differences in political knowledge. *Journal of Politics*, *66*(2), 492–512. https://doi.org/10.1111/j.1468-2508.2004.00161.x

Mondak, J. J., & Davis, B. (2001). Asked and answered: Knowledge levels when we will not take “don't know” for an answer. *Political Behavior*, *23*(3), 199–224. https://doi.org/10.1023/A:1015015227594

Morton, T. A., Rabinovich, A., Marshall, D., & Bretschneider, P. (2011). The future that may (or may not) come: How framing changes responses to uncertainty in climate change communications. *Global Environmental Change*, *21*(1), 103–109. https://doi.org/10.1016/j.gloenvcha.2010.09.013

Moser, S. C. (2010). Communicating climate change: History, challenges, process and future directions. *Wiley Interdisciplinary Reviews: Climate Change*, *1*(1), 31–53. https://doi.org/10.1002/wcc.11

Moser, S. C., & Dilling, L. (Eds.). (2007). *Creating a climate for change: Communicating climate change and facilitating social change*. New York, NY: Cambridge University Press.

Myers, T. A., Nisbet, M. C., Maibach, E. W., & Leiserowitz, A. A. (2012). A public health frame arouses hopeful emotions about climate change. *Climatic Change*, *113*(3/4), 1105–1112. https://doi.org/10.1007/s10584-012-0513-6

Nachreiner, M., Mack, B., Matthies, E., & Tampe-Mai, K. (2015). An analysis of smart metering information systems: A psychological model of self-regulated behavioural change. *Energy Research & Social Science*, *9*, 85–97. https://doi.org/10.1016/j.erss.2015.08.016

Neaman, A., Otto, S., & Vinokur, E. (2018). Toward an integrated approach to environmental and prosocial education. *Sustainability*, *10*(3), 583. https://doi.org/10.3390/su10030583

Nerlich, B., Koteyko, N., & Brown, B. (2010). Theory and language of climate change communication. *Wiley Interdisciplinary Reviews: Climate Change*, *1*(1), 97–110. https://doi.org/10.1002/wcc.2

Neverla, I., & Schäfer, M. S. (Eds.). (2012). *Das Medienklima. Fragen und Befunde der kommunikationswissenschaftlichen Klimaforschung.* [The media climate. Questions and findings of communication science on climate research]. Wiesbaden: Springer VS.

Neverla, I., & Taddicken, M. (2012). Der Klimawandel aus Rezipientensicht: Relevanz und Forschungsstand [Climate change from recipients' perspective: Relevance and state of research]. In I. Neverla & M. S. Schäfer (Eds.), *Das Medienklima. Fragen und Befunde der kommunikationswissenschaftlichen Klimaforschung.* (pp. 215–231). Wiesbaden: Springer VS.

Newig, J. (2011). Climate change as an element of sustainability communication. In J. Godemann & G. Michelsen (Eds.), *Sustainability communication: Interdisciplinary perspectives and theoretical foundation* (pp. 119–128). Dordrecht, New York: Springer.

Nisbet, M. C. (2009). Communicating climate change: Why frames matter for public engagement. *Environment*, *51*(2), 12–23. https://doi.org/10.3200/ENVT.51.2.12-23

Nisbet, M. C., & Kotcher, J. E. (2009). A two-step flow of influence? Opinion-leader campaigns on climate change. *Science Communication*, *30*(3), 328–354. https://doi.org/10.1177/1075547008328797

Nolan, J. M., Schultz, P. W., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2008). Normative social influence is underdetected. *Personality and Social Psychology Bulletin*, *34*(7), 913–923. https://doi.org/10.1177/0146167208316691

O’Neill, S. J., & Hulme, M. (2009). An iconic approach for representing climate change. *Global Environmental Change*, *19*(4), 402–410. https://doi.org/10.1016/j.gloenvcha.2009.07.004

O’Neill, S. J., & Nicholson-Cole, S. (2009). “Fear won't do it”: Promoting positive engagement with climate change through visual and iconic representations. *Science Communication*, *30*(3), 355–379. https://doi.org/10.1177/1075547008329201

O'Connor, R. E., Bord, R. J., & Fisher, A. (1999). Risk perceptions, general environmental beliefs, and willingness to address climate change. *Risk Analysis*, *19*(3), 461–471. https://doi.org/10.1023/A:1007004813446

O'Connor, R. E., Bord, R. J., Yarnal, B., & Wiefek, N. (2002). Who wants to reduce greenhouse gas emissions? *Social Science Quarterly*, *83*(1), 1–17. https://doi.org/10.1111/1540-6237.00067

OECD. (2000). *Towards sustainable development: Indicators to measure progress*. Retrieved from http://www.oecd.org/site/worldforum/33703694.pdf

O'Neill, S. J., & Smith, N. (2014). Climate change and visual imagery. *Wiley Interdisciplinary Reviews: Climate Change*, *5*(1), 73–87. https://doi.org/10.1002/wcc.249

Oreskes, N. (2004). The scientific consensus on climate change. *Science*, *306*(5702), 1686. https://doi.org/10.1126/science.1103618

O'Rourke, H. P., & MacKinnon, D. P. (2015). When the test of mediation is more powerful than the test of the total effect. *Behavior Research Methods*, *47*(2), 424–442. https://doi.org/10.3758/s13428-014-0481-z

Osbaldiston, R., & Schott, J. P. (2012). Environmental sustainability and behavioral science: Meta-analysis of proenvironmental behavior experiments. *Environment and Behavior*, *44*(2), 257–299. https://doi.org/10.1177/0013916511402673

Oschatz, C. (2018). *Wissen im Wandel: Der Einfluss der Klimaberichterstattung auf den klimapolitischen Wissenserwerb* [Changing knowledge. The impact of climate news coverage on climate political knowledge acquisition]. Wiesbaden: Springer Fachmedien Wiesbaden. Retrieved from http://dx.doi.org/10.1007/978-3-658-18832-0

Ott, K., Muraca, B., & Baatz, C. (2011). Strong sustainability as a frame for sustainability communication. In J. Godemann & G. Michelsen (Eds.), *Sustainability communication: Interdisciplinary perspectives and theoretical foundation* (pp. 13–25). Dordrecht, New York: Springer.

Otto, S. (2007). Bedeutung und Verwendung der Begriffe nachhaltige Entwicklung und Nachhaltigkeit. Eine empirische Studie [The meaning and use of the terms sustainable development and sustainability. An empirical study] (Dissertation). Jacobs University, Bremen. Retrieved from https://opus.jacobs-university.de/frontdoor/index/index/docId/378

Otto, S., & Kaiser, F. G. (2014). Ecological behavior across the lifespan: Why environmentalism increases as people grow older. *Journal of Environmental Psychology*, *40*, 331–338. https://doi.org/10.1016/j.jenvp.2014.08.004

Otto, S., & Pensini, P. (2017). Nature-based environmental education of children: Environmental knowledge and connectedness to nature, together, are related to ecological behaviour. *Global Environmental Change*, *47*, 88–94. https://doi.org/10.1016/j.gloenvcha.2017.09.009

Pahl, S., & Bauer, J. (2013). Overcoming the distance: Perspective taking with future humans improves environmental engagement. *Environment and Behavior*, *45*(2), 155–169. https://doi.org/10.1177/0013916511417618

Pahl, S., Sheppard, S., Boomsma, C., & Groves, C. (2014). Perceptions of time in relation to climate change. *Wiley Interdisciplinary Reviews: Climate Change*, *5*(3), 375–388. https://doi.org/10.1002/wcc.272

Pahl, S., & Wyles, K. J. (2017). The human dimension: How social and behavioural research methods can help address microplastics in the environment. *Analytical Methods*, *9*(9), 1404–1411. https://doi.org/10.1039/C6AY02647H

Painter, J., Kristiansen, S., & Schäfer, M. S. (2018). How 'digital-born' media cover climate change in comparison to legacy media: A case study of the COP 21 summit in Paris. *Global Environmental Change*, *48*, 1–10. https://doi.org/10.1016/j.gloenvcha.2017.11.003

Panno, A., Giacomantonio, M., Carrus, G., Maricchiolo, F., Pirchio, S., & Mannetti, L. (2017). Mindfulness, pro-environmental behavior, and belief in climate change: The mediating role of social dominance. *Environment & Behavior*, 0013916517718887. https://doi.org/10.1177/0013916517718887

Pape, T. von, Quandt, T., Scharkow, M., & Vogelgesang, J. (2012). Nachrichtengeographie des Zuschauerinteresses [News geography of audience interests]. *Medien & Kommunikationswissenschaft*, *60*, 159–182.

Park, H. S., & Vedlitz, A. (2013). Climate hazards and risk status: Explaining climate risk assessment, behavior, and policy support. *Sociological Spectrum*, *33*(3), 219–239. https://doi.org/10.1080/02732173.2013.732900

Patel, T., & Holm, M. (2017). Practicing mindfulness as a means for enhancing workplace pro-environmental behaviors among managers. *Journal of Environmental Planning and Management*, *10*(2), 1–26. https://doi.org/10.1080/09640568.2017.1394819

Patt, A. G., & Weber, E. U. (2014). Perceptions and communication strategies for the many uncertainties relevant for climate policy. *Wiley Interdisciplinary Reviews: Climate Change*, *5*(2), 219–232. https://doi.org/10.1002/wcc.259

Pavey, L., Greitemeyer, T., & Sparks, P. (2011). Highlighting relatedness promotes prosocial motives and behavior. *Personality and Social Psychology Bulletin*, *37*(7), 905–917. https://doi.org/10.1177/0146167211405994

Petrovic, N., Madrigano, J., & Zaval, L. (2014). Motivating mitigation: When health matters more than climate change. *Climatic Change*, *126*(1-2), 245–254. https://doi.org/10.1007/s10584-014-1192-2

Petty, R. E., & Cacioppo, J. T. (1979). Issue involvement can increase or decrease persuasion by enhancing message-relevant cognitive responses. *Journal of Personality and Social Psychology*, *37*(10), 1915–1926. https://doi.org/10.1037/0022-3514.37.10.1915

Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (pp. 123–205). New York: Academic Press.

Petty, R. E., Cacioppo, J. T., & Goldman, R. (1981). Personal involvement as a determinant of argument-based persuasion. *Journal of Personality and Social Psychology*, *41*(5), 847–855. https://doi.org/10.1037/0022-3514.41.5.847

Pfattheicher, S., Sassenrath, C., & Schindler, S. (2015). Feelings for the suffering of others and the environment: Compassion fosters proenvironmental tendencies. *Environment & Behavior*, *48*(7), 929–945. https://doi.org/10.1177/0013916515574549

Pfautsch, S., & Gray, T. (2017). Low factual understanding and high anxiety about climate warming impedes university students to become sustainability stewards. *International Journal of Sustainability in Higher Education*, *18*(7), 1157–1175. https://doi.org/10.1108/IJSHE-09-2016-0179

Phillips, S. T., & Ziller, R. C. (1997). Toward a theory and measure of the nature of nonprejudice. *Journal of Personality and Social Psychology*, *72*(2), 420–434. https://doi.org/10.1037/0022-3514.72.2.420

Pilgeram, R., & Meeuf, R. (2014). Good food, good intentions: Where pro-sustainability arguments get stale in US food documentaries. *Environmental Communication*, *9*(1), 100–117. https://doi.org/10.1080/17524032.2014.967706

Poortinga, W., Spence, A., Whitmarsh, L., Capstick, S. B., & Pidgeon, N. F. (2011). Uncertain climate: An investigation into public scepticism about anthropogenic climate change. *Global Environmental Change*, *21*(3), 1015–1024. https://doi.org/10.1016/j.gloenvcha.2011.03.001

Post, S. (2016). Communicating science in public controversies: Strategic considerations of the German climate scientists. *Public Understanding of Science*, *25*(1), 61–70. https://doi.org/10.1177/0963662514521542

Powell, T. E., Boomgaarden, H. G., Swert, K. de, de Vreese, C. H., & Vreese, C. H. de. (2015). A clearer picture: The contribution of visuals and text to framing effects. *Journal of Communication*, *65*(6), 997–1017. https://doi.org/10.1111/jcom.12184

Priester, J. R., Brinol, P., & Petty, R. E. (2009). Mass media attitude change: Implications of the elaboration likelihood model of persuasion. In J. Bryant & M. B. Oliver (Eds.), *Media effects: Advances in theory and reserach* (3rd ed., pp. 125–164). New York, NY: Routledge.

Pufé, I. (2017). *Nachhaltigkeit* [Sustainability] (3rd ed.). Konstanz: UVK Verlagsgesellschaft mbH.

Rabinovich, A., & Morton, T. A. (2011). Subgroup identities as a key to cooperation within large social groups. *British Journal of Social Psychology*, *50*(1), 36–51. https://doi.org/10.1348/014466610X486356

Rabinovich, A., Morton, T. A., & Birney, M. E. (2012). Communicating climate science: The role of perceived communicator's motives. *Journal of Environmental Psychology*, *32*(1), 11–18. Retrieved from 10.1016/j.jenvp.2011.09.002

Rabinovich, A., Morton, T. A., Postmes, T., & Verplanken, B. (2009). Think global, act local: The effect of goal and mindset specificity on willingness to donate to an environmental organization. *Journal of Environmental Psychology*, *29*(4), 391–399. https://doi.org/10.1016/j.jenvp.2009.09.004

Rabinovich, A., Morton, T. A., Postmes, T., & Verplanken, B. (2012). Collective self and individual choice: The effects of inter-group comparative context on environmental values and behaviour. *British Journal of Social Psychology*, *51*(4), 551–569. https://doi.org/10.1111/j.2044-8309.2011.02022.x

Raykov, T. (2001). Estimation of congeneric scale reliability using covariance structure analysis with nonlinear constraints. *British Journal of Mathematical and Statistical Psychology*, *54*(2), 315–323. https://doi.org/10.1348/000711001159582

Reese, G. (2016). Common human identity and the path to global climate justice. *Climatic Change*, *134*(4), 521–531. https://doi.org/10.1007/s10584-015-1548-2

Reese, G., & Kohlmann, F. (2014). Feeling global, acting ethically: Global identification and fairtrade consumption. *The Journal of Social Psychology*, *155*(2), 98–106. https://doi.org/10.1080/00224545.2014.992850

Reese, G., Proch, J., & Cohrs, J. C. (2014). Individual differences in responses to global inequality. *Analyses of Social Issues and Public Policy*, *14*(1), 217–238. https://doi.org/10.1111/asap.12032

Reese, G., Proch, J., & Finn, C. (2015). Identification with all humanity: The role of self-definition and self-investment. *European Journal of Social Psychology*, *45*(4), 426–440. https://doi.org/10.1002/ejsp.2102

Reinermann, J. L., Lubjuhn, S., Bouman, M., & Singhal, A. (2014). Entertainment-education: Storytelling for the greater, greener good. *International Journal of Sustainable Development*, *17*(2), 176. https://doi.org/10.1504/IJSD.2014.061781

Renger, D., & Reese, G. (2017). From equality-based respect to environmental activism: Antecedents and consequences of global identity. *Political Psychology*, *38*(5), 867–879. https://doi.org/10.1111/pops.12382

Revelle, W. (2018). *psych. R package version 1.8.3.3*. Retrieved from https://cran.r-project.org/web/packages/psych/psych.pdf

Reysen, S., & Hackett, J. (2016). Further examination of the factor structure and validity of the Identification with all Humanity Scale. *Current Psychology*, *35*(4), 1–13. https://doi.org/10.1007/s12144-015-9341-y

Reysen, S., & Katzarska-Miller, I. (2013). A model of global citizenship: Antecedents and outcomes. *International Journal of Psychology*, *48*(5), 858–870. https://doi.org/10.1080/00207594.2012.701749

Rhodes, N., Toole, J., & Arpan, L. M. (2016). Persuasion as reinforcement: Strengthening the pro-environmental attitude-behavior relationship through ecotainment programming. *Media Psychology*, *19*(3), 1–24. https://doi.org/10.1080/15213269.2015.1106322

Ripple, W. J., Wolf, C., Newsome, T. M., Galetti, M., Alamgir, M., Crist, E., . . . Laurance, W. F. (2017). World scientists' warning to humanity: A second notice. *BioScience*, *67*(12), 1026–1028. https://doi.org/10.1093/biosci/bix125

Roczen, N., Kaiser, F. G., Bogner, F. X., & Wilson, M. (2014). A competence model for environmental education. *Environment and Behavior*, *46*(8), 972–992. https://doi.org/10.1177/0013916513492416

Römpke, A.-K. (2017, August). *Intergroup contact as a means to foster identification with humanity and pro-environmental behavior intentions*. International Conference on Environmental Psychology, A Coruña, Spain.

Rosenmann, A., Reese, G., & Cameron, J. E. (2016). Social identities in a globalized world: Challenges and opportunities for collective action. *Perspectives on Psychological Science*, *11*(2), 202–221. https://doi.org/10.1177/1745691615621272

Roser-Renouf, C., Maibach, E. W., Leiserowitz, A. A., & Zhao, X. (2014). The genesis of climate change activism: From key beliefs to political action. *Climatic Change*, *125*(2), 163–178. https://doi.org/10.1007/s10584-014-1173-5

Roser-Renouf, C., & Nisbet, M. C. (2008). The measure of key behavioral science constructs in climate change research. *International Journal of Sustainability Communication*, *3*, 37–95.

Rosseel, Y. (2017). *lavaan: latent variable analysis. R package version 0.5-23.1097*. Retrieved from https://cran.r-project.org/web/packages/lavaan/lavaan.pdf

Rothschild, Z. K., Landau, M. J., Sullivan, D., & Keefer, L. A. (2012). A dual-motive model of scapegoating: Displacing blame to reduce guilt or increase control. *Journal of Personality and Social Psychology*, *102*(6), 1148–1163. https://doi.org/10.1037/a0027413

Running, K. (2013). World citizenship and concern for global warming: Building the case for a strong international civil society. *Social Forces*, *92*(1), 377–399. https://doi.org/10.1093/sf/sot077

Ryghaug, M., Holtan Sørensen, K., & Næss, R. (2011). Making sense of global warming: Norwegians appropriating knowledge of anthropogenic climate change. *Public Understanding of Science*, *20*(6), 778–795. https://doi.org/10.1177/0963662510362657

Sacchi, S., Riva, P., & Aceto, A. (2016). Myopic about climate change: Cognitive style, psychological distance, and environmentalism. *Journal of Experimental Social Psychology*, *65*, 68–73. https://doi.org/10.1016/j.jesp.2016.03.006

Sakellari, M. (2015). Cinematic climate change, a promising perspective on climate change communication. *Public Understanding of Science*, *24*(7), 827–841. https://doi.org/10.1177/0963662514537028

Scannell, L., & Gifford, R. (2013). Personally relevant climate change: The role of place attachment and local versus global message framing in engagement. *Environment and Behavior*, *45*(1), 60–85. https://doi.org/10.1177/0013916511421196

Schächtele, K., & Hertle, H. (2007). *Die CO2 Bilanz des Bürgers: Recherche für ein internetbasiertes Tool zur Erstellung persönlicher CO2 Bilanzen* [The carbon footprint of the citizen. Investigation for an online tool to assess personal carbon footprints]. Retrieved from Umweltbundesamt website: http://www.klimaktiv.de/media/docs/Studien/20642110_uba_die_co2-bilanz_des_buergers.pdf

Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods*, *7*(2), 147–177. https://doi.org/10.1037/1082-989x.7.2.147

Schäfer, M. S. (2012). Online communication on climate change and climate politics: A literature review. *Wiley Interdisciplinary Reviews: Climate Change*, *3*(6), 527–543. https://doi.org/10.1002/wcc.191

Schäfer, M. S., & Schlichting, I. (2014). Media representations of climate change: A meta-analysis of the research field. *Environmental Communication*, *8*(2), 142–160. https://doi.org/10.1080/17524032.2014.914050

Schenk, N. J., & Lensink, S. M. (2007). Communicating uncertainty in the IPCC's greenhouse gas emissions scenarios. *Climatic Change*, *82*(3/4), 293–308. https://doi.org/10.1007/s10584-006-9194-3

Scheufele, B. (2004). Framing-effects approach: A theoretical and methodological critique. *Communications*, *29*(4), 401–428. https://doi.org/10.1515/comm.2004.29.4.401

Scheufele, D. A. (1999). Framing as a theory of media effects. *Journal of Communication*, *49*(1), 103–122. https://doi.org/10.1111/j.1460-2466.1999.tb02784.x

Schmidt, A., Ivanova, A., & Schäfer, M. S. (2013). Media attention for climate change around the world: A comparative analysis of newspaper coverage in 27 countries. *Global Environmental Change*, *23*(5), 1233–1248. https://doi.org/10.1016/j.gloenvcha.2013.07.020

Schmitt, J. B., Schneider, F. M., Weinmann, C., & Roth, F. S. (2017). Saving tiger, orangutan & Co: How subjective knowledge and text complexity influence online information seeking and behavior. *Information, Communication & Society*, 1–19. https://doi.org/10.1080/1369118X.2017.1410206

Schoenefeld, J. J., & McCauley, M. R. (2016). Local is not always better: The impact of climate information on values, behavior and policy support. *Journal of Environmental Studies and Sciences*, *6*(4), 1–9. https://doi.org/10.1007/s13412-015-0288-y

Schuldt, J. P., Konrath, S. H., & Schwarz, N. (2011). “Global warming” or “climate change”?: Whether the planet is warming depends on question wording. *Public Opinion Quarterly*, *75*(1), 115–124. https://doi.org/10.1093/poq/nfq073

Schultz, P. W., Milfont, T. L., Chance, R. C., Tronu, G., Luís, S., Ando, K., . . . Gouveia, V. V. (2014). Cross-cultural evidence for spatial bias in beliefs about the severity of environmental problems. *Environment and Behavior*, *46*(3), 267–302. https://doi.org/10.1177/0013916512458579

Schutte, N. S., & Malouff, J. M. (2018). Mindfulness and connectedness to nature: A meta-analytic investigation. *Personality and Individual Differences*, *127*, 10–14. https://doi.org/10.1016/j.paid.2018.01.034

Schütz, A. (1982). *Das Problem der Relevanz* [The problem of relevance]. Frankfurt am Main: Suhrkamp.

Schwartz, S. H. (1977). Normative influences on altruism. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (pp. 221–279). New York: Academic Press. https://doi.org/10.1016/S0065-2601(08)60358-5

Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (pp. 1–65). San Diego, Calif., London: Academic Press. https://doi.org/10.1016/S0065-2601(08)60281-6

SemTools Contributors. (2016). *semTools: useful tools for structural equation modeling. R package version 0.4-14*. Retrieved from https://cran.r-project.org/web/packages/semTools/semTools.pdf

Seyranian, V., Sinatra, G. M., & Polikoff, M. S. (2015). Comparing communication strategies for reducing residential water consumption. *Journal of Environmental Psychology*, *41*, 81–90. https://doi.org/10.1016/j.jenvp.2014.11.009

Sharman, A. (2014). Mapping the climate sceptical blogosphere. *Global Environmental Change*, *26*, 159–170. https://doi.org/10.1016/j.gloenvcha.2014.03.003

Shi, J., Visschers, V. H. M., & Siegrist, M. (2015). Public perception of climate change: The importance of knowledge and cultural worldviews. *Risk Analysis*, *35*(12), 2183–2201. https://doi.org/10.1111/risa.12406

Shi, J., Visschers, V. H. M., Siegrist, M., & Arvai, J. (2016). Knowledge as a driver of public perceptions about climate change reassessed. *Nature Climate Change*, *6*(8), 759–762. https://doi.org/10.1038/nclimate2997

Shome, D., & Marx, S. M. (2009). *The psychology of climate change communication: A guide for scientists, journalists, educators, political aides, and the interested public*. New York, NY. Retrieved from Center of Research on Environmental Decisions, Columbia University website: http://guide.cred.columbia.edu/pdfs/CREDguide_full-res.pdf

Shwom, R., Dan, A., & Dietz, T. (2008). The effects of information and state of residence on climate change policy preferences. *Climatic Change*, *90*(4), 343–358. https://doi.org/10.1007/s10584-008-9428-7

Smith, L. G. E., Thomas, E. F., & McGarty, C. (2015). "We must be the change we want to see in the world": Integrating norms and identities through social interaction. *Political Psychology*, *36*(5), 543–557. https://doi.org/10.1111/pops.12180

Smith, N., & Leiserowitz, A. A. (2012). The rise of global warming skepticism: Exploring affective image associations in the United States over time. *Risk Analysis*, *32*(6), 1021–1032. https://doi.org/10.1111/j.1539-6924.2012.01801.x

Spence, A., Leygue, C., Bedwell, B., & O'Malley, C. (2014). Engaging with energy reduction: Does a climate change frame have the potential for achieving broader sustainable behaviour? *Journal of Environmental Psychology*, *38*(0), 17–28. https://doi.org/10.1016/j.jenvp.2013.12.006

Spence, A., & Pidgeon, N. (2010). Framing and communicating climate change: The effects of distance and outcome frame manipulations. *Global Environmental Change*, *20*(4), 656–667. https://doi.org/10.1016/j.gloenvcha.2010.07.002

Spence, A., Poortinga, W., Butler, C., & Pidgeon, N. F. (2011). Perceptions of climate change and willingness to save energy related to flood experience. *Nature Climate Change*, *1*(1), 46–49. https://doi.org/10.1038/nclimate1059

Spence, A., Poortinga, W., & Pidgeon, N. (2012). The psychological distance of climate change. *Risk Analysis*, *32*(6), 957–972. https://doi.org/10.1111/j.1539-6924.2011.01695.x

Stamm, K. R., Clark, F., & Eblacas, P. R. (2000). Mass communication and public understanding of environmental problems: The case of global warming. *Public Understanding of Science*, *9*(3), 219–237. https://doi.org/10.1088/0963-6625/9/3/302

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Environmental Psychology on the Move*, *29*(3), 309–317. https://doi.org/10.1016/j.jenvp.2008.10.004

Steinhorst, J., & Klöckner, C. A. (2017). Effects of monetary versus environmental information framing: Implications for long-term pro-environmental behavior and intrinsic motivation. *Environment & Behavior*, 1-35. https://doi.org/10.1177/0013916517725371

Steinhorst, J., Klöckner, C. A., & Matthies, E. (2015). Saving electricity – For the money or the environment? Risks of limiting pro-environmental spillover when using monetary framing. *Journal of Environmental Psychology*, *43*, 125–135. https://doi.org/10.1016/j.jenvp.2015.05.012

Stephan, E., Liberman, N., & Trope, Y. (2011). The effects of time perspective and level of construal on social distance. *Journal of Experimental Social Psychology*, *47*(2), 397–402. https://doi.org/10.1016/j.jesp.2010.11.001

Stern, N. (2006). *Stern review report on the economics of climate change*. Norwich, England: HMSO. Retrieved from http://webarchive.nationalarchives.gov.uk/20100407172811/http://www.hm-treasury.gov.uk/stern_review_report.htm

Stern, P. C. (2000). New environmental theories: Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, *56*(3), 407–424. https://doi.org/10.1111/0022-4537.00175

Stern, P. C. (2012). Psychology: Fear and hope in climate messages. *Nature Climate Change*, *2*(8), 572–573. https://doi.org/10.1038/nclimate1610

Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human Ecology Review*, *6*(2), 81–97. Retrieved from http://www.jstor.org/stable/24707060

Sundblad, E.-L., Biel, A., & Gärling, T. (2008). Knowledge and confidence in knowledge about climate change among experts, journalists, politicians, and laypersons. *Environment & Behavior*, *41*(2), 281–302. https://doi.org/10.1177/0013916508314998

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston, MA: Allyn & Bacon/Pearson Education.

Taddicken, M. (2013). Climate change from the user's perspective: The impact of mass media and internet use and individual and moderating variables on knowledge and attitudes. *Journal of Media Psychology: Theories, Methods, and Applications*, *25*(1), 39–52. https://doi.org/10.1027/1864-1105/a000080

Taddicken, M., & Neverla, I. (2011). Klimawandel aus Sicht der Mediennutzer. Multifaktorielles Wirkungsmodell der Medienerfahrung zur komplexen Wissensdomäne Klimawandel [Climate change from recipients' perspective. Multifactorial model of media experience in the complex knowledge domain climate change]. *M&K Medien & Kommunikationswissenschaft*, *59*(4), 505–525. https://doi.org/10.5771/1615-634x-2011-4-505

Tajfel, H., & Turner, J. C. (1979). An integrative theory of intergroup conflict. In W. G. Austin & S. Worchel (Eds.), *The social psychology of intergroup relations* (pp. 33–47). Monterey, CA: Brooks Cole.

Tapia-Fonllem, C., Corral-Verdugo, V., Fraijo-Sing, B., & Durón-Ramos, M. (2013). Assessing sustainable behavior and its correlates: A measure of pro-ecological, frugal, altruistic and equitable actions. *Sustainability*, *5*(2), 711–723. https://doi.org/10.3390/su5020711

Tavoni, A., Dannenberg, A., Kallis, G., & Löschel, A. (2011). Inequality, communication, and the avoidance of disastrous climate change in a public goods game. *Proceedings of the National Academy of Sciences of the United States of America*, *108*(29), 11825–11829. https://doi.org/10.1073/pnas.1102493108

Tezel, E., & Giritli, H. (2018). Understanding sustainability through mindfulness: A systematic review. In S. Fırat, J. Kinuthia, & A. Abu-Tair (Eds.), *Lecture Notes in Civil Engineering: volume 7. Proceedings of 3rd International Sustainable Buildings Symposium (ISBS 2017)* (Vol. 7, pp. 321–327). Cham, Switzerland: Springer. https://doi.org/10.1007/978-3-319-64349-6_25

Tobler, C., Visschers, V. H. M., & Siegrist, M. (2012). Consumers' knowledge about climate change. *Climatic Change*, *114*(2), 189–209. https://doi.org/10.1007/s10584-011-0393-1

Trepte, S. (2006). Social identity theory. In J. Bryant & P. Vorderer (Eds.), *Psychology of entertainment* (pp. 255–271). Mahwah, NJ: Lawrence Erlbaum Associates.

Trepte, S., & Loy, L. S. (2017). Social identity theory and self-categorization theory. In P. Rössler, C. Hoffner, & L. van Zoonen (Eds.), *The international encyclopedia of media effects* (pp. 1–13). West-Sussex: Wiley-Blackwell. https://doi.org/10.1002/9781118783764.wbieme0088

Trepte, S., Loy, L., Schmitt, J. B., & Otto, S. (2017). Hohenheimer Inventar zum Politikwissen (HIP). Konstruktion und Skalierung. [Hohenheim Inventory on Political Knowledge (HIP). Construction and scaling.]. *Diagnostica*, *63*(3), 206–218. https://doi.org/10.1026/0012-1924/a000180

Trepte, S., Schmitt, J. B., & Dienlin, T. (2018). Good news! How reading valenced news articles influences positive distinctiveness and learning from news. *Journal of Media Psychology*, *30*(2), 66–78. https://doi.org/10.1027/1864-1105/a000182

Trexler, A., & Johns-Putra, A. (2011). Climate change in literature and literary criticism. *Wiley Interdisciplinary Reviews: Climate Change*, *2*(2), 185–200. https://doi.org/10.1002/wcc.105

Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review*, *117*(2), 440–463. https://doi.org/10.1037/a0018963

Tu, L., Khare, A., & Zhang, Y. (2012). A short 8-item scale for measuring consumers' local–global identity. *International Journal of Research in Marketing*, *29*(1), 35–42. https://doi.org/10.1016/j.ijresmar.2011.07.003

Türken, S., & Rudmin, F. W. (2013). On the psychological effects of globalization: Development of a scale of global identity. *Psychology & Society*, *5*(2), 63–89.

Turner, J. C., Hogg, M. A., Oakes, P. J., Reicher, S. D., & Wetherell, M. S. (1987). *Rediscovering the social group: A self-categorization theory*. Cambridge, MA, US: Basil Blackwell.

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, *211*(4481), 453–458. https://doi.org/10.1126/science.7455683

Uggla, Y. (2008). Strategies to create risk awareness and legitimacy: The Swedish climate campaign. *Journal of Risk Research*, *11*(6), 719–734. https://doi.org/10.1080/13669870701746316

Unsworth, K. L., & Fielding, K. S. (2014). It's political: How the salience of one's political identity changes climate change beliefs and policy support. *Global Environmental Change*, *27*, 131–137. https://doi.org/10.1016/j.gloenvcha.2014.05.002

Unsworth, K. L., & McNeill, I. M. (2017). Increasing pro-environmental behaviors by increasing self-concordance: Testing an intervention. *The Journal of Applied Psychology*, *102*(1), 88–103. https://doi.org/10.1037/apl0000155

Vallacher, R. R., & Wegner, D. M. (1989). Levels of personal agency: Individual variation in action identification. *Journal of Personality and Social Psychology*, *57*(4), 660–671. https://doi.org/10.1037/0022-3514.57.4.660

Van der Linden, S. L., Maibach, E. W., & Leiserowitz, A. A. (2015). Improving public engagement with climate change: Five "best practice" insights from psychological science. *Perspectives on Psychological Science*, *10*(6), 758–763. https://doi.org/10.1177/1745691615598516

Van Eimeren, B., & Egger, A. (2016). *Informationen für's Leben: BR Studie zum Vertrauen in die Medien* [Information for life: BR study on trust in media]. Retrieved from https://www.br.de/presse/inhalt/pressemitteilungen/glaubwuerdigkeitsstudie-pdf-100.html

Van Eimeren, B., & Koch, W. (2016). Nachrichtenkonsum im Netz steigt an – auch klassische Medien profitieren [Online news consumption increases - also classic media profit]. *Media Perspektiven*, *5*(2016), 277–285.

Van Haden, R., Niles, M. T., Lubell, M., Perlman, J., & Jackson, L. E. (2012). Global and local concerns: What attitudes and beliefs motivate farmers to mitigate and adapt to climate change? *PloS One*, *7*(12), 1–7. https://doi.org/10.1371/journal.pone.0052882

Van Schuur, W. H. (2003). Mokken scale analysis: Between the Guttman scale and parametric item response theory. *Political Analysis*, *11*(02), 139–163. https://doi.org/10.1093/pan/mpg002

Van Vugt, M. (2009). Averting the tragedy of the commons: Using social psychological science to protect the environment. *Current Directions in Psychological Science*, *18*(3), 169–173. https://doi.org/10.1111/j.1467-8721.2009.01630.x

VCD. (2014). *VCD Bahntest 2014/2015: Die Bahn im Vergleich mit Fernlinienbus und Auto* [The train compared to long-distance coach and car]. Retrieved from Verkehrsclub Deutschland website: https://www.vcd.org/fileadmin/user_upload/Redaktion/Publikationsdatenbank/Bahn/VCD_Bahntest_2014-2015.pdf

Villar, A., & Krosnick, J. A. (2011). Global warming vs. climate change, taxes vs. prices: Does word choice matter? *Climatic Change*, *105*(1-2), 1–12. https://doi.org/10.1007/s10584-010-9882-x

Visser, P. S., Krosnick, J. A., & Simmons, J. P. (2003). Distinguishing the cognitive and behavioral consequences of attitude importance and certainty: A new approach to testing the common-factor hypothesis. *Journal of Experimental Social Psychology*, *39*(2), 118–141. https://doi.org/10.1016/S0022-1031(02)00522-X

Vraga, E. K., Anderson, A. A., Kotcher, J. E., & Maibach, E. W. (2015). Issue-specific engagement: How facebook contributes to opinion leadership and efficacy on energy and climate issues. *Journal of Information Technology & Politics*, *12*(2), 200–218. https://doi.org/10.1080/19331681.2015.1034910

Wakslak, C. J. (2012). The where and when of likely and unlikely events. *Organizational Behavior and Human Decision Processes*, *117*(1), 150–157. https://doi.org/10.1016/j.obhdp.2011.10.004

Wang, J., Geng, L., Schultz, P. W., & Zhou, K. (2017). Mindfulness increases the belief in climate change: The mediating role of connectedness with nature. *Environment & Behavior*, 0013916517738036. https://doi.org/10.1177/0013916517738036

WCED. (1987). Our common future. Retrieved from http://www.un-documents.net/our-common-future.pdf

Webb, D. J., Mohr, L. A., & Harris, K. E. (2008). A re-examination of socially responsible consumption and its measurement. *Journal of Business Research*, *61*(2), 91–98. https://doi.org/10.1016/j.jbusres.2007.05.007

Weber, P., & Wirth, W. (2013). Nachrichtenfaktoren und Relevanzattribution. Der Einfluss von Nachrichtenfaktoren auf Relevanzurteile von Rezipienten und die moderierende Rolle von Civic Pride [News values and relevance attribution: The influence of news values on recipients' judgements of relevance and the moderating role of civic pride]. *Medien Und Kommunikationswissenschaft*, *61*(4), 514–531. https://doi.org/10.5771/1615-634x-2013-4-514

Werner, C. M., Cook, S., Colby, J., & Lim, H.-J. (2012). “Lights out” in university classrooms: Brief group discussion can change behavior. *Journal of Environmental Psychology*, *32*(4), 418–426. https://doi.org/10.1016/j.jenvp.2012.07.001

White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica*, *48*(4), 817. https://doi.org/10.2307/1912934

Whitmarsh, L. (2011). Scepticism and uncertainty about climate change: Dimensions, determinants and change over time. *Global Environmental Change*, *21*(2), 690–700. https://doi.org/10.1016/j.gloenvcha.2011.01.016

Whitmarsh, L., O’Neill, S. J., & Lorenzoni, I. (Eds.). (2011). *Engaging the public with climate change: Behaviour change and communication*. New York, NY: Earthscan.

Wibeck, V. (2014). Enhancing learning, communication and public engagement about climate change – some lessons from recent literature. *Environmental Education Research*, *20*(3), 387–411. https://doi.org/10.1080/13504622.2013.812720

Wickham, H. (2017). *reshape: Flexibly reshape data. R package version 0.8.7*. Retrieved from https://cran.r-project.org/web/packages/reshape/reshape.pdf

Wickham, H., & Chang, W. (2016). *ggplot2: Create elegant data visualisations using the grammar of graphics. R package version 2.2.1*. Retrieved from https://cran.r-project.org/web/packages/ggplot2/ggplot2.pdf

Wiest, S. L., Raymond, L., & Clawson, R. A. (2015). Framing, partisan predispositions, and public opinion on climate change. *Global Environmental Change*, *31*(0), 187–198. https://doi.org/10.1016/j.gloenvcha.2014.12.006

Wilcox, R. (2005). *Introduction to robust estimation and hypothesis testing* (2nd ed.). Burlington, MA: Elsevier.

Williams, H. T. P., McMurray, J. R., Kurz, T., & Lambert, F. H. (2015). Network analysis reveals open forums and echo chambers in social media discussions of climate change. *Global Environmental Change*, *32*, 126–138. https://doi.org/10.1016/j.gloenvcha.2015.03.006

Williams, L. E., Stein, R., & Galguera, L. (2014). The distinct affective consequences of psychological distance and construal level. *Journal of Consumer Research*, *40*(6), 1123–1138. https://doi.org/10.1086/674212

Wilson, K. M. (2000). Drought, debate, and uncertainty: Measuring reporters' knowledge and ignorance about climate change. *Public Understanding of Science*, *9*(1), 1–13. https://doi.org/10.1088/0963-6625/9/1/301

Wilson Rowe, E. (2009). Who is to blame? Agency, causality, responsibility and the role of experts in Russian framings of global climate change. *Europe-Asia Studies*, *61*(4), 593–619. https://doi.org/10.1080/09668130902826154

Wirth, W. (2006). Involvement. In J. Bryant & P. Vorderer (Eds.), *Psychology of entertainment* (pp. 199–213). Mahwah: Erlbaum.

Wise, K., Eckler, P., Kononova, A., & Littau, J. (2009). Exploring the hardwired for news hypothesis: How threat proximity affects the cognitive and emotional processing of health-related print news. *Communication Studies*, *60*(3), 268–287. https://doi.org/10.1080/10510970902956024

Xu, Q. (2017). Dual process models of persuasion. In P. Rössler, C. Hoffner, & L. van Zoonen (Eds.), *The international encyclopedia of media effects* (pp. 1–13). West-Sussex: Wiley-Blackwell. https://doi.org/10.1002/9781118783764.wbieme0074

Yang, C., Nay, S., & Hoyle, R. H. (2010). Three approaches to using lengthy ordinal scales in structural equation models: Parceling, latent scoring, and shortening scales. *Applied Psychological Measurement*, *34*(2), 122–142. https://doi.org/10.1177/0146621609338592

Yarnal, B., O'Connor, R. E., & Shudak, R. (2003). The impact of local versus national framing on willingness to reduce greenhouse gas emissions: A case study from central Pennsylvania. *Local Environment: the International Journal of Justice and Sustainability*, *8*(4), 457. https://doi.org/10.1080/13549830306668

Zahran, S., Brody, S. D., Grover, H., & Vedlitz, A. (2006). Climate change vulnerability and policy support. *Society & Natural Resources*, *19*(9), 771–789. https://doi.org/10.1080/08941920600835528

Zamith, R., Pinto, J., & Villar, M. E. (2013). Constructing climate change in the Americas: An analysis of news coverage in U.S. and South American newspapers. *Science Communication*, *35*(3), 334–357. https://doi.org/10.1177/1075547012457470

Zhao, X. (2009). Media use and global warming perceptions: A snapshot of the reinforcing spirals. *Communication Research*, *36*(5), 698–723. https://doi.org/10.1177/0093650209338911

Zillmann, D. (2002). Exemplification theory of media influence. In J. Bryant & D. Zillmann (Eds.), *LEA's communication series. Media effects: Advances in theory and research (2nd ed.)* (pp. 19–41). Mahwah, NJ US: Lawrence Erlbaum Associates Publishers.

Zwick, M. M., & Renn, O. (2002). *Perception and evaluation of risks: Findings of the "Baden-Württemberg risk survey 2001"* (Arbeitsbericht / Akademie für Technikfolgenabschätzung in Baden-

Württemberg). Stuttgart. Retrieved from
https://www.researchgate.net/publication/266486733_Perception_and_Evaluation_of_Risks_Findings_of_the_Baden-Wurttemberg_Risk_Survey_2001

Websites

The used websites were last checked on 06/24/2018.

- http://action.earthday.net/p/dia/action3/common/public/?action_KEY=18560
- https://blog.gopili.co.uk/travel/britons-can-cut-half-of-their-co2-emissions-when-travelling-by-changing-their-transportation-habits/
- https://www.bbc.com/news/science-environment-24021772
- https://www.bbcgoodfood.com/seasonal-calendar/all
  (The table on the website looked different on 06/24/2018 compared to the one I used, cf. screenshot in Appendix)
- http://www.die-klima-allianz.de/wer-wir-sind/aktivitaten/
  (This website was not available anymore on 06/24/2018)
- https://en.wikipedia.org/wiki/Life-cycle_greenhouse-gas_emissions_of_energy_sources#cite_note-NREL-LCA1-1
- https://ergebnisse.zensus2011.de/#dynTable:absRel=ANZAHL;ags=00;agsAxis=X
- http://hec.est.org.uk/About.aspx
  (The homepage was not available on 06/24/2018 because the Home Energy Check was under redevelopment)
- https://liftshare.com/uk
- https://www.soscisurvey.de/help/doku.php/de:results:variables#antwortzeiten
- http://www.sueddeutsche.de/wissen/erderwaermung-was-forscher-ueber-den-klimawandel-wirklich-wissen-1.2757138
- http://www.thegreenage.co.uk/the-cost-of-leaving-appliances-in-standby-mode/
- https://www.theguardian.com/environment/2013/oct/08/potential-impacts-climate-change-uk
- https://www.uni-hohenheim.de/einrichtung/global-campus-hohenheim
- http://uba.klimaktiv-co2-rechner.de/de_DE/page/
  (The website looked different on 06/24/2018 compared to the one I used, cf. screenshot in Appendix and is available here: http://uba.co2-rechner.de/de_DE/)
- https://www.umweltbundesamt.de/themen/verkehr-laerm/emissionsdaten
- https://utopia.de/ueber-utopia/
- https://www.youtube.com/watch?v=zlfKdbWwruY

Appendix

1. Measures Study 1

1.1 Perceived communicated distance of climate change in news coverage

Instruction:

Nun interessiert uns, wie Sie im Allgemeinen die Berichterstattung zum Klimawandel in den Medien einschätzen.

Wenn über den Klimawandel berichtet wird, geht es vor allem um…

Answer format: 7-point semantic differential

1. die Gegenwart … die Zukunft
2. Leute wie mich … andere Menschen
3. nahe Orte … ferne Orte
4. sichere Fakten … unsichere Meinungen

1.2 Psychological distance of climate change

Sources: Jones et al. (2017); Spence et al. (2012)

Instruction:

Nun haben wir einige Fragen zu Ihrer Einschätzung des Klimawandels.

Inwieweit lehnen Sie die folgenden Aussagen ab oder stimmen den Aussagen zu?

Answer format: 1 = lehne vollkommen ab, 2 = lehne überwiegend ab, 3 = lehne eher ab, 4 = teils/teils, 5 = stimme eher zu, 6 = stimme überwiegend zu, 7 = stimme voll und ganz zu

Psychological social distance

1. Vor allem für Andere hat der Klimawandel ernste Konsequenzen.
2. Auswirkungen des Klimawandels erleben vor allem Menschen, die ich nicht kenne.
3. Der Klimawandel ist vor allem für Andere ein großes Problem.
4. Vor allem Menschen, die ich nicht kenne, sind mit Folgen des Klimawandels konfrontiert.

Psychological spatial distance

1. Vor allem an weit entfernten Orten hat der Klimawandel ernste Konsequenzen.
2. Beim Thema Klimawandel denke ich an entfernte Länder.
3. Der Klimawandel ist vor allem an weit entfernten Orten ein großes Problem.
4. Vor allem entfernte Länder erleben Auswirkungen des Klimawandels.

Psychological temporal distance

1. Beim Thema Klimawandel denke ich an die Zukunft.
2. Erst in Zukunft wird der Klimawandel ernste Konsequenzen haben.
3. Der Klimawandel wird erst in Zukunft ein großes Problem sein.

Psychological hypothetical distance

1. Ich bin unsicher, ob es den Klimawandel wirklich gibt.
2. Es herrscht wenig Einigkeit in der Wissenschaft zum Klimawandel.
3. Es ist unklar, welche Auswirkungen der Klimawandel hat.

1.3 Relevance attributed to the climate change issue

Sources: Spence and Pidgeon (2010); Weber and Wirth (2013)

Instruction:

Wir möchten nun gern erfahren, welche Rolle das Thema Klimawandel aus Ihrer Sicht spielt.

Answer format: 7-point semantic differential

Das Thema Klimawandel ist <u>für mich persönlich</u>...
1. unwichtig ... wichtig
2. irrelevant ... relevant
3. unbedeutend ... bedeutend
4. uninteressant ... interessant

Das Thema Klimawandel ist <u>gesellschaftlich</u>...
1. unwichtig ... wichtig
2. irrelevant ... relevant
3. unbedeutend ... bedeutend
4. uninteressant ... interessant

1.4 Climate change knowledge

Sources: Shi et al. (2015); Tobler et al. (2012); items were provided by the authors.

Mit dem Begriff „Klimawandel" bezieht sich dieser Fragebogen auf die <u>jüngeren weltweiten Veränderungen des Klimas</u> in den letzten 250 Jahren (seit der Industrialisierung) – nicht auf die Klimaschwankungen der gesamten Erdgeschichte (wie Eis- und Warmzeiten).
→ *positioned at the start of the questionnaire*

Answer format: richtig, falsch || weiß nicht
(-) wrong statements, reverse-coded.

Climate system knowledge

Physical knowledge CO2 and greenhouse effect	Infit	δ
1. Treibhausgase halten die Wärmeabstrahlung der Erde teilweise zurück.	1.09	0.34
2. Kohlendioxid (CO_2) ist ein Treibhausgas.	1.11	-0.69
3. CO_2 ist für Pflanzen schädlich. (-)	1.06	0.15
4. CO_2 entsteht unter anderem bei der Verbrennung von Öl.	0.94	-0.53
5. Bei gleicher Menge ist CO_2 für das Klima schädlicher als Methan. (-)	0.98	1.42
6. Das Ozonloch ist die Hauptursache für den Treibhauseffekt. (-)	1.04	1.36
7. In einem Kernkraftwerk wird beim Stromgewinnungsprozess CO_2 ausgestoßen. (-)	0.99	1.19

Climate change and its causes	Infit	δ
8. Der weltweite Temperaturanstieg im letzten Jahrhundert war der grösste seit 1 000 Jahren.	0.97	0.07
9. Der heutige weltweite CO_2-Wert in der Atmosphäre ist in den letzten 650 000 Jahren bereits vorgekommen. (-)	1.04	1.51
10. Die 90er Jahre waren weltweit das wärmste Jahrzehnt des letzten Jahrhunderts.	1.12	1.09
11. Der weltweite CO_2-Gehalt in der Atmosphäre hat in den letzten 250 Jahren zugenommen.	0.78	-1.29
12. Die Hauptursachen für den Klimawandel sind natürliche Ursachen (wie die wechselnde Sonnenintensität oder Vulkanausbrüche). (-)	0.90	-0.43
13. Die Zunahme von CO_2 ist mit grosser Wahrscheinlichkeit die Hauptursache des Klimawandels.	0.93	-0.63
14. Der Klimawandel wird hauptsächlich durch menschliche Aktivitäten verursacht.	0.99	-1.10

Climate change consequences	Infit	δ
Für die nächsten Jahrzehnte erwartet die Mehrheit der Klimaforscher...		
15. ... eine Abkühlung des Klimas. (-)	0.95	-0.66
16. ... dass bei einem wärmeren Klima mehr Wasser verdunstet, wodurch der Meeresspiegel insgesamt sinken wird. (-)	0.84	0.04

		Infit	δ
17.	... dass Extremereignisse wie Dürren, Überflutungen, Hochwasser und Stürme tendenziell zunehmen werden.	0.84	-1.92
18.	... dass bei einem wärmeren Klima mehr Eis an den Polkappen schmilzt, wodurch der Meeresspiegel insgesamt steigen wird.	0.82	-1.73
19.	... dass sich das Klima weltweit gleichmässig verändern wird. (-)	1.02	0.51
20.	... dass Niederschläge weltweit in allen Regionen zunehmen werden. (-)	0.98	1.52
21.	…eine Zunahme hitzebedingter Erkrankungen (z. B. Hyperthermie) und Tode durch häufigere und längere Hitzewellen.	0.97	-0.24

Climate protective behavioural knowledge

Climate relevant actions

		Infit	δ
1.	Es kann viel Energie gespart werden durch das Abschalten der Stromversorgung von elektrischen Geräten, die momentan nicht genutzt werden.	0.80	-1.79
2.	Eine Verlagerung von Herstellungsprozessen und den damit verbundenen CO_2-Emissionen in andere Länder verringert den Klimawandel. (-)	0.81	-0.06
3.	Um im Winter zu lüften, ist es am klimafreundlichsten, wenn ein Kippfenster für längere Zeit geöffnet wird. (-)	0.83	-1.31
4.	Es kostet weniger Energie, einen vollen Kessel mit Wasser zum Teekochen zu verwenden anstelle von zweimal ½ Wasserkessel.	1.18	0.51
5.	Deutsche Gurken im Dezember stammen aus Freilandproduktion. (-)	0.84	-0.75
6.	Das Gute am Recycling ist, dass keine Energie verloren geht. (-)	0.87	0.66
7.	Treibgase in Spraydosen tragen zum Treibhauseffekt bei. (-)	0.86	2.75

Effectiveness of climate relevant actions (could not be used due to programming mistake)

1. Pro Person und Kilometer ist der durchschnittliche CO_2-Ausstoss eines Autos um ein Vielfaches höher als bei einem Zug.
2. Auf Kurzstreckenflügen (z.B. innerhalb von Europa) wird pro Person und Kilometer durchschnittlich weniger CO_2 ausgestossen als bei Langstreckenflügen (z.B. Europa - Amerika). (-)
3. Ein Kopfsalat aus dem beheizten Gewächshaus verursacht weniger CO_2 als ein Kopfsalat aus Freilandproduktion. (-)
4. Bei der Produktion von Fleisch und Milchprodukten entstehen pro Kilo mehr Treibhausgase als bei der Produktion von Gemüse.
5. Die Herstellung von Recyclingpapier benötigt halb so viel Energie wie die Herstellung herkömmlichen Papiers.
6. Italienische Tomaten benötigen im Vergleich zu lokal angebauten doppelt so viel Energie.

1.5 Climate protective behaviour

Sources: Kaiser (1998); Kaiser and Wilson (2000); Kaiser and Wilson (2004); items were provided by the authors.

Instruction:
Im Folgenden finden Sie eine Liste von Handlungen. Bitte geben Sie an, wie häufig Sie diese Handlungen ausführen. Kreuzen Sie „*kann ich nicht beantworten*“ an, wenn eine Frage auf Ihre momentane Lebenssituation nicht zutrifft (beispielsweise können Sie keine Angaben über Ihr Fahrverhalten machen, wenn Sie keinen Führerschein besitzen).

Answer format: nie, selten, ab und zu, oft, sehr oft || kann ich nicht beantworten

(-) reverse-coded items.

		Infit	δ
1.	Für den Weg zur Arbeit benutze ich das Fahrrad, öffentliche Verkehrsmittel oder gehe zu Fuß.	0.95	0.05
2.	Ich kaufe Lebensmittel aus kontrolliert biologischem Anbau.	0.86	0.86

3.	Ich fliege innerhalb Deutschlands. (-)	0.98	-2.27
4.	Ich warte, bis ich eine volle Wäschetrommel habe, bevor ich wasche.	0.91	-2.81
5.	Ich fahre mit dem Auto in die Stadt bzw. ich fahre in der Stadt Auto. (-)	0.92	0.49
6.	Um zu lüften, lasse ich auch im Winter das Fenster längere Zeit offen. (-)	1.16	-0.42
7.	Wenn ich in einem Geschäft eine Plastiktüte bekomme, nehme ich sie. (-)	0.95	-0.51
8.	Für Fahrten in die Umgebung (bis 30 km) benutze ich öffentliche Nahverkehrsmittel oder das Fahrrad.	0.95	0.53
9.	Ich sammle altes Papier und gebe es zum Recycling.	1.00	-1.97
10.	Ich kaufe Getränke in Mitnahmebechern (z.B. Coffee-to-go). (-)	0.97	-1.86
11.	Ich mache jemanden, der sich klimaschädigend verhält, darauf aufmerksam.	0.93	1.49
12.	Ich spende für Klimaschutzorganisationen.	0.95	2.74
13.	Ich kaufe Fertiggerichte. (-)	1.01	-0.41
14.	Ich kaufe Nahrungsmittel (z.B. Obst und Gemüse) aus der Region.	0.84	-1.00
15.	Ich kaufe Obst und Gemüse der Jahreszeit entsprechend.	0.83	-1.34
16.	Ich benutze einen Wäschetrockner. (-)	1.13	-0.57
17.	Ich informiere mich über Klimaschutz (z.B. in Büchern, Zeitschriften oder im Internet).	0.90	0.63
18.	Ich unterhalte mich mit Bekannten über die Auswirkungen des Klimawandels.	0.87	1.25
19.	Ich boykottiere Produkte von Firmen, die sich nachweislich klimaschädigend verhalten.	0.83	0.40
20.	Für längere Reisen (ab 600km) nehme ich das Flugzeug. (-)	1.18	-0.30
21.	Im Winter drehe ich meine Heizung herunter, wenn ich meine Wohnung für mehr als 4 Stunden verlasse.	0.96	-0.58
22.	Beim Verlassen des Zimmers lösche ich das Licht.	0.99	-2.38
23.	Ich lasse meine Geräte (z.B. Fernseher) im Standby-Modus. (-)	1.07	-0.54
24.	Ich teile elektrische Geräte mit anderen, anstatt neue Geräte anzuschaffen.	1.01	1.86
25.	Ich verzichte auf Fleisch.	0.93	1.49

Instruction:
Nun möchten wir gern erfahren, ob die folgenden Aussagen auf Sie zutreffen.

Answer format: ja, nein || kann ich nicht beantworten

		Infit	δ
26.	Ich bin in einem Car-Sharing Pool.	0.98	2.84
27.	In meiner Wohnung ist es im Winter so warm, dass man ohne Pullover nicht friert. (-)	1.06	-1.26
28.	Ich benutze verbrauchsarme Haushaltsgeräte.	0.94	-2.52
29.	Ich verzichte auf ein Auto.	0.98	1.13
30.	Ich beziehe Ökostrom.	1.01	0.38
31.	Ich ernähre mich vegetarisch.	0.93	2.56
32.	An meinem Computer ist die Energiesparfunktion aktiviert.	0.95	-1.93
33.	Ich bin Mitglied in einer Organisation, die sich dem Klimaschutz widmet.	0.95	3.46
34.	Durch mein Fahrverhalten versuche ich, den Kraftstoffverbrauch so niedrig wie möglich zu halten.	0.93	-2.44
35.	Ich habe ein Konto bei einer ethisch-ökologischen Bank.	0.95	2.93

1.6 Social identity, including global identity

Source: Reese et al. (2015)
Instruction:
Mit den folgenden Fragen möchten wir etwas über Ihre Person erfahren.

1. Wie nahe fühlen Sie sich jeder dieser folgenden Gruppen?

Answer format: 1 = gar nicht nahe, 2 = nicht sehr nahe, 3 = ein bisschen nahe, 4 = ziemlich nahe, 5 = sehr nahe

a) Menschen in meinem persönlichen Umfeld
b) Deutschen
c) Europäern
d) Menschen auf der ganzen Welt

2. Wie oft benutzen Sie das Wort „wir“ wenn Sie über die folgenden Gruppen sprechen?

   Answer format: 1 = fast nie, 2 = selten, 3 = ab und zu, 4 = oft, 5 = sehr oft

   a) Menschen in meinem persönlichen Umfeld
   b) Deutschen
   c) Europäern
   d) Menschen auf der ganzen Welt

3. Wie viel haben Sie Ihrer Meinung nach mit den folgenden Gruppen gemeinsam?

   Answer format: 1 = fast nichts gemeinsam, 2 = wenig gemeinsam, 3 = etwas gemeinsam, 4 = ziemlich viel gemeinsam, 5 = sehr viel gemeinsam

   a) Menschen in meinem persönlichen Umfeld
   b) Deutschen
   c) Europäern
   d) Menschen auf der ganzen Welt

4. Manchmal bezeichnen Menschen auch jene als “Familie”, die eigentlich nicht Teil der eigenen Familie sind. Wie sehr betrachten Sie die folgenden Gruppen als “Familie”?

   Answer format: 1 = gar nicht, 2 = kaum, 3 = ein wenig, 4 = ziemlich, 5 = sehr

   a) Menschen in meinem persönlichen Umfeld
   b) Deutschen
   c) Europäern
   d) Menschen auf der ganzen Welt

5. Wie sehr identifizieren Sie sich mit jeder der folgenden Gruppen (d.h., fühlen sich zugehörig, empfinden Zuneigung zu ihnen, sorgen sich um sie)?

   Answer format: 1 = gar nicht, 2 = kaum, 3 = ein wenig, 4 = ziemlich, 5 = sehr

   a) Menschen in meinem persönlichen Umfeld
   b) Deutschen
   c) Europäern
   d) Menschen auf der ganzen Welt

6. Wie betroffen fühlen Sie sich, wenn einer der folgenden Gruppen etwas Schlimmes passiert?

   Answer format: 1 = gar nicht, 2 = kaum, 3 = ein wenig, 4 = ziemlich, 5 = sehr

   a) Menschen in meinem persönlichen Umfeld
   b) Deutschen
   c) Europäern
   d) Menschen auf der ganzen Welt

7. Wie sehr möchten Sie Folgendes sein:

   Answer format: 1 = gar nicht, 2 = kaum, 3 = ein wenig, 4 = ziemlich, 5 = sehr

   a) ein verantwortungsvolles Mitglied in meinem persönlichen Umfeld
   b) ein verantwortungsvoller Bürger/eine verantwortungsvolle Bürgerin Deutschlands
   c) ein verantwortungsvoller Bürger/eine verantwortungsvolle Bürgerin Europas
   d) ein verantwortungsvoller Bürger/eine verantwortungsvolle Bürgerin der Welt

8. Wie wichtig ist es Ihnen,

   Answer format: 1 = gar nicht, 2 = kaum, 3 = ein wenig, 4 = ziemlich, 5 = sehr

   a) Ihrem persönlichen Umfeld gegenüber aufrichtig zu sein?
   b) gegenüber Deutschen aufrichtig zu sein?
   c) gegenüber Europäern aufrichtig zu sein
   d) gegenüber Menschen auf der ganzen Welt aufrichtig zu sein?

9. Wie sehr möchten Sie folgenden Gruppen helfen, wenn diese Hilfe benötigen?

   Answer format: 1 = gar nicht, 2 = kaum, 3 = ein wenig, 4 = ziemlich, 5 = sehr

   a) Menschen in meinem persönlichen Umfeld
   b) Deutschen
   c) Europäern
   d) Menschen auf der ganzen Welt

1.7 Contact with the climate change issue in communication

Sources: Taddicken (2013); projects at the Department of Media Psychology, Prof. Dr. Sabine Trepte

Instruction:
Außerdem möchten wie gerne erfahren, wo Sie mit Informationen über den Klimawandel in Kontakt kommen. Wie häufig erfahren Sie etwas über den Klimawandel…

Answer format: 0 = nie, 1 = einmal im halben Jahr oder seltener, 2 = mehrmals im halben Jahr, 3 = einmal im Monat, 4 = mehrmals im Monat, 5 = mehrmals pro Woche

1. …in privaten Fernsehsendern (z. B. RTL, Sat1 oder Pro7, inklusive Online-Mediatheken oder Streaming)
2. …in öffentlich-rechtlichen Fernsehsendern (z. B. ARD, ZDF, Dritte Programme, inklusive Online-Mediatheken oder Streaming)
3. …im Radio
4. …in regionalen Tageszeitungen
5. …in überregionalen Tageszeitungen
6. …in Wochenzeitungen
7. …in Broschüren (z. B. von Klimaschutzorganisationen)
8. …in Fachzeitschriften
9. …im Internet
10. …in Vorträgen oder Veranstaltungen
11. …im Gespräch mit anderen (z. B. Familie, Freunde, Bekannte)

Instruction (filter Internet):
Wir möchten noch etwas genauer wissen, wo Sie im Internet mit dem Thema Klimawandel in Kontakt kommen.
Wie häufig erfahren Sie in den folgenden Online-Angeboten etwas über den Klimawandel?

1. …in Onlinezeitungen (z. B. spiegel.de)
2. …in sozialen Netzwerken (z. B. Facebook)
3. …in Videoportalen (z. B. YouTube)
4. …in Diskussionsplattformen (z.B. Foren)

2. Measures Study 2

2.1 Psychological distance of climate change

Sources: Jones et al. (2017); Spence et al. (2012)

Instruction:

Wir möchten Ihnen nun einige Fragen zum Thema Klimawandel stellen.
Zunächst interessiert uns Ihre Einschätzung des Klimawandels.

Inwieweit lehnen Sie die folgenden Aussagen ab oder stimmen den Aussagen zu?

Answer format: 1 = lehne vollkommen ab, 2 = lehne überwiegend ab, 3 = lehne eher ab, 4 = teils/teils, 5 stimme eher zu, 6 = stimme überwiegend zu, 7 = stimme voll und ganz zu

Psychological social distance

1. Vor allem für Andere hat der Klimawandel ernste Konsequenzen.
2. Auswirkungen des Klimawandels erleben vor allem Menschen, die ich nicht kenne.
3. Der Klimawandel ist vor allem für Andere ein großes Problem.
4. Vor allem Menschen, die ich nicht kenne, sind mit Folgen des Klimawandels konfrontiert.

Psychological spatial distance

1. Vor allem an weit entfernten Orten hat der Klimawandel ernste Konsequenzen.
2. Beim Thema Klimawandel denke ich an entfernte Länder.
3. Der Klimawandel ist vor allem an weit entfernten Orten ein großes Problem.
4. Vor allem entfernte Länder erleben Auswirkungen des Klimawandels.

Psychological temporal distance

1. Beim Thema Klimawandel denke ich an die Zukunft.
2. Erst in Zukunft wird der Klimawandel ernste Konsequenzen haben.
3. Der Klimawandel wird erst in Zukunft ein großes Problem sein.

Psychological hypothetical distance

1. Ich bin unsicher, ob es den Klimawandel wirklich gibt.
2. Es herrscht wenig Einigkeit in der Wissenschaft zum Klimawandel.
3. Es ist unklar, welche Auswirkungen der Klimawandel hat.

2.2 Relevance attributed to the news text on climate change

Sources: Spence and Pidgeon (2010); Weber and Wirth (2013)

Instruction:
Nun interessiert uns ihre Einschätzung des Artikels über den Klimawandel.
Bitte rufen Sie sich den Artikel, den sie soeben gelesen haben, noch einmal in Erinnerung.
Der Artikel ist…

Answer format: 7-point semantic differential

1. unwichtig … wichtig
2. irrelevant … relevant
3. unbedeutend … bedeutend
4. uninteressant … interessant
5. nutzlos … nützlich

Control items for manipulation check positioned here:

6. schlecht geschrieben … gut geschrieben
7. unglaubwürdig … glaubwürdig
8. unverständlich … verständlich

2.3 Climate change knowledge

Sources: Frick et al. (2004); Kaiser and Frick (2002); Shi et al. (2015); Tobler et al. (2012)

Instruction:

Experimental conditions: Nun interessiert uns, an welche Inhalte des Artikels Sie sich noch erinnern.

Control condition: Nun interessiert uns, was Sie über die Annahmen des Weltklimarates zum Thema Klimawandel wissen.

Correct answers for multiple-choice questions are marked in bold face.

Coded answers for the open questions are displayed.

Climate system knowledge

Physical knowledge CO_2 and greenhouse effect	**Infit**	**δ**
1. Welche Gase sind treibhauswirksam? (*offene Frage*)		
(1) CO_2 (auch kodiert: Kohlenstoffdioxid)	1.02	-2.78
(2) Methan (auch kodiert: CH_4)	0.85	-1.65
(3) Lachgas (auch kodiert: Distickstoffmonoxid, N_2O, Stickoxid)	0.96	0.04
2. Welche fossilen Brennstoffe beschleunigen die Klimaerwärmung? (*offene Frage*)		
(1) Gas	0.90	-0.25
(2) Öl (auch kodiert: Benzin, Kerosin)	0.96	-1.76
(3) Kohle	0.94	-1.35

Climate change and its causes	**Infit**	**δ**
3. Wie stark ist die globale Temperatur zwischen 1880 und 2012 laut Weltklimarat in etwa angestiegen? a) 0,4 Grad b) **0,8 Grad** c) 1,3 Grad d) 2 Grad e) Weiß ich nicht.	0.95	-0.44
4. In welchen Zeitraum fallen die zehn wärmsten Jahre seit Beginn systematischer Messungen? a) Nach 1917 b) Nach 1957 c) Nach 1987 d) **Nach 1997** e) Weiß ich nicht.	0.94	-1.50
5. Ab wann müssten laut Szenario des Weltklimarates die Treibhausgas-Emissionen stark abnehmen, um die Erwärmung des Klimas im Vergleich zur vorindustriellen Zeit auf etwa 1,5 Grad zu begrenzen? a) **2030** b) 2050 c) 2070 d) 2100 e) Weiß ich nicht.	1.14	-0.94
6. Wie stark ist der Meeresspiegel im 20. Jahrhundert laut Weltklimarat angestiegen? a) 9 cm b) **19 cm** c) 39 cm d) 59 cm e) Weiß ich nicht.	1.04	-0.30

		Infit	δ
7.	Warum steigt der Meeresspiegel? (*offene Frage*)		
	(1) Eis der Pole uns Gletscher schmelzen	0.91	-3.49
	(2) Permafrostböden tauen	0.95	2.95

Climate change consequences		Infit	δ
8.	Welche Wetterphänomene sind durch den Klimawandel in Zukunft verstärkt zu erwarten? (*offene Frage*)		
	(1) Hitzewellen (auch kodiert: extreme Hitze, heißere Sommer)	1.13	-0.21
	(2) Dürreperioden (auch kodiert: Trockenheit, Wüste)	0.95	-0.67
	(3) Milde Winter (auch kodiert: kein Schnee)	1.12	0.99
	(4) Niederschlag (auch kodiert: Regen, Starkregen)	1.06	0.04
	(5) Stürme (auch kodiert: Orkane, Tornados)	1.12	-0.71
	(6) Hochwasser (auch kodiert: Überschwemmung, Überflutung)	1.10	-0.53
	(7) Waldbrand	0.87	2.41
9.	Welche Gesundheitsrisiken sind durch den Klimawandel in Zukunft verstärkt zu erwarten? (*offene Frage*)		
	(1) Herz-Kreislauf-Erkrankungen	1.10	-0.21
	(2) Infektionskrankheiten durch Insekten/ Chikungunya-Fieber/ Hanta-Virus/ Lungen- und Nierenentzündungen (auch kodiert: Malaria)	0.85	-0.39
	(3) Feinstaubbelastung	0.96	2.95
	(4) Schadstoffe im Wasser	0.92	2.41
	(5) Ernährungssicherheit	1.13	1.76
10.	Die Produktion welcher Lebensmittel kann durch den Klimawandel negativ beeinflusst werden? (*offene Frage*)		
	(1) Fisch	0.93	2.65
	(2) Reis	0.82	0.41
	(3) Weizen (auch kodiert: Getreide)	0.82	0.14
	(4) Mais	0.74	0.47

Climate protective behavioural knowledge

Climate relevant actions		Infit	δ
11.	Was bedeutet Mitigation? (*offene Frage*) Maßnahmen zur Reduktion der Treibhausgasemissionen, um den Klimawandel abzumildern	0.95	1.86
12.	In welchen Monaten sind in Deutschland regional-saisonale Tomaten erhältlich? a) Februar bis November b) **Juli bis Oktober** c) September bis November d) Mai bis Oktober e) Weiß ich nicht.	1.32	-1.08
13.	Was bedeutet Adaptation? (*offene Frage*) Anpassung von natürlichen und menschlichen Systemen an bereits bestehende und erwartete Klimaänderungen	0.72	1.77
14.	Welche Gewohnheiten südeuropäischer Länder können der Anpassung an wärmeres Klima dienen? (*offene Frage*)		
	(1) Mehr Leitungswasser trinken	0.66	0.67
	(2) Siesta	0.82	-0.85

Effectiveness of climate relevant actions		Infit	δ
15.	Wie viel CO_2 wird bei einer Flugreise im Vergleich zu einer Bahnreise in Deutschland bei gleicher Distanz erzeugt? a) etwa 2-mal so viel b) **etwa 5-mal so viel** c) etwa 20-mal so viel	0.76	0.73

d) etwa 50-mal so viel
e) Weiß ich nicht.
https://www.umweltbundesamt.de/themen/verkehr-laerm/emissionsdaten; (VCD, 2014)

16. Wie viele Treibhausgase entstehen bei der Produktion von Fleisch im Vergleich zu der gleichen Menge Gemüse? 1.10 0.73
    a) etwa 3-mal so viel
    b) etwa 10-mal so viel
    c) **etwa 30-mal so viel**
    d) etwa 100-mal so viel
    e) Weiß ich nicht.
    (Schächtele & Hertle, 2007)

17. Wie viel Energie lässt sich in deutschen Haushalten Schätzungen zu Folge durchschnittlich durch den Verzicht auf den Stand-by-Modus elektrischer Geräte einsparen? 1.15 0.91
    a) **100 Euro**
    b) 500 Euro
    c) 800 Euro
    d) 1000 Euro
    e) Weiß ich nicht.

2.4 Climate protective behaviour

Information behaviour

Source: Pahl and Bauer (2013)

Instruction:

Im Folgenden stellen wir Ihnen einige Klimainitiativen vor.

1. Im Internet kann man seinen eigenen CO_2-Fußabdruck berechnen. Haben Sie Interesse sich diesen Rechner jetzt anzusehen?

   Answer format: ja, nein

   Wenn ja: Screenshot (*http://uba.klimaktiv-co2-rechner.de/de_DE/page/*)
   Können Sie sich vorstellen, den Rechner auszuprobieren?

   Answer format: 0 = nein, 1 = eher nicht, 2 = unentschlossen, 3 = vielleicht schon, 4 = ja || habe ich bereits

2. Ein Newsletter der Klimaallianz Deutschland informiert über lokale Handlungsoptionen, mit denen Menschen zur Verringerung des Klimawandels oder zum Umgang mit den Folgen beitragen können. Möchten Sie nähere Informationen erhalten?

   Answer format: ja, nein

   Wenn ja: Screenshot (*http://www.die-klima-allianz.de/wer-wir-sind/aktivitaten/*)
   Können Sie sich vorstellen, diesen Newsletter zu abonnieren?

   Answer format: 0 = nein, 1 = eher nicht, 2 = unentschlossen, 3 = vielleicht schon, 4 = ja || habe ich bereits

3. Das soziale Netzwerk Utopia ist eine Online-Plattform, um sich über eine klimafreundliche Lebensweise zu informieren und auszutauschen. Haben Sie Interesse, sich Utopia jetzt anzusehen?

   Answer format: ja, nein

   Wenn ja: Screenshot (*https://utopia.de/ueber-utopia/*)
   Können Sie sich vorstellen, Utopia beizutreten?

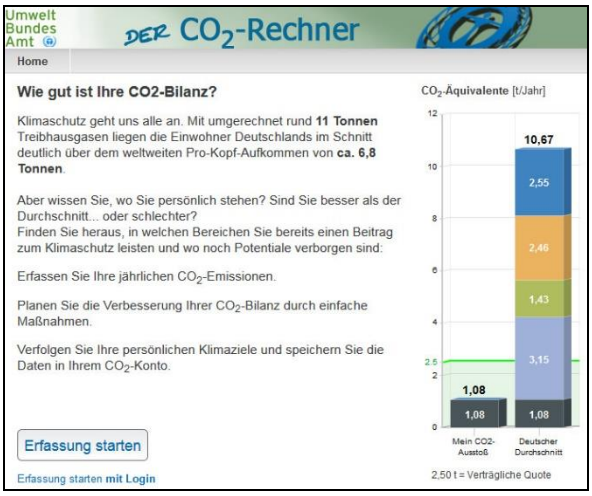
   Answer format: 0 = nein, 1 = eher nicht, 2 = unentschlossen, 3 = vielleicht schon, 4 = ja || ich bin bereits Mitglied

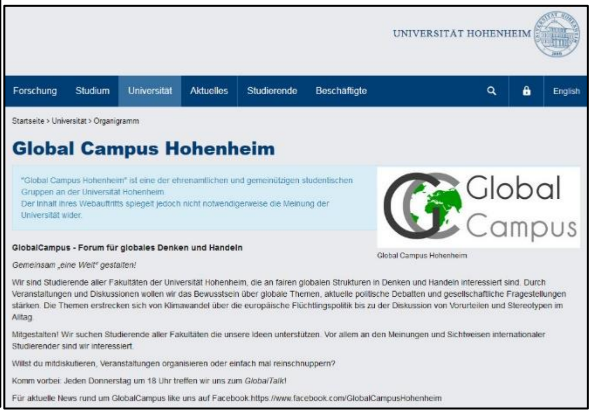
4. Die Hochschulgruppe Global Campus diskutiert und engagiert sich für die Lösung globaler Herausforderungen beispielsweise durch den Klimawandel. Haben Sie Interesse sich Global Campus jetzt anzusehen?

   Answer format: ja, nein

   Wenn ja: Screenshot (*https://www.uni-hohenheim.de/einrichtung/global-campus-hohenheim*)
   Können Sie sich vorstellen, bei Global Campus (oder einer ähnlichen Hochschulgruppe) mitzuwirken?

   Answer format: 0 = nein, 1 = eher nicht, 2 = unentschlossen, 3 = vielleicht schon, 4 = ja || mache ich bereits





Donation behaviour

Source: Reese et al. (2015)

1. Donation intention
   Das mehrfach ausgezeichnete Unternehmen "Atmosfair" bietet eine Kompensation für entstandene CO_2-Emissionen durch den Ausbau erneuerbarer Energien.

Als Aufwandsentschädigung für Ihre Teilnahme an dieser Studie erhalten Sie 5 Euro. Wenn Sie möchten, steht es Ihnen frei, einen Teil des Geldes an "Atmosfair" zu spenden. Falls Sie etwas spenden möchten, klicken Sie unten auf den gewünschten Betrag. Ansonsten klicken Sie auf keine Spende.

Answer format: Keine Spende, 1 Euro, 2 Euro, 3 Euro, 4 Euro, 5 Euro

2. Donation
   Sie können nun den Umschlag an Ihrem Platz öffnen. Entnehmen Sie den Betrag, den Sie mitnehmen möchten. Lassen Sie den Rest einfach im Umschlag an Ihrem Platz liegen. Er wird von uns später eingesammelt und an Atmosfair gespendet.

2.5 Social identity, including global identity

Source: Reese et al. (2015)
Instruction:
Mit den folgenden Fragen möchten wir etwas über Ihre Person erfahren.

1. Wie nahe fühlen Sie sich jeder dieser folgenden Gruppen?

   Answer format: 1 = gar nicht nahe, 2 = nicht sehr nahe, 3 = ein bisschen nahe, 4 = ziemlich nahe, 5 = sehr nahe

   a) Menschen in meinem persönlichen Umfeld
   b) Deutschen
   c) Europäern
   d) Menschen auf der ganzen Welt
2. Wie oft benutzen Sie das Wort „wir“ wenn Sie über die folgenden Gruppen sprechen?

   Answer format: 1 = fast nie, 2 = selten, 3 = ab und zu, 4 = oft, 5 = sehr oft

   a) Menschen in meinem persönlichen Umfeld
   b) Deutschen
   c) Europäern
   d) Menschen auf der ganzen Welt
3. Wie viel haben Sie Ihrer Meinung nach mit den folgenden Gruppen gemeinsam?

   Answer format: 1 = fast nichts gemeinsam, 2 = wenig gemeinsam, 3 = etwas gemeinsam, 4 = ziemlich viel gemeinsam, 5 = sehr viel gemeinsam

   a) Menschen in meinem persönlichen Umfeld
   b) Deutschen
   c) Europäern
   d) Menschen auf der ganzen Welt
4. Manchmal bezeichnen Menschen auch jene als “Familie”, die eigentlich nicht Teil der eigenen Familie sind. Wie sehr betrachten Sie die folgenden Gruppen als “Familie”?

   Answer format: 1 = gar nicht, 2 = kaum, 3 = ein wenig, 4 = ziemlich, 5 = sehr

   a) Menschen in meinem persönlichen Umfeld
   b) Deutschen
   c) Europäern
   d) Menschen auf der ganzen Welt
5. Wie sehr identifizieren Sie sich mit jeder der folgenden Gruppen (d.h., fühlen sich zugehörig, empfinden Zuneigung zu ihnen, sorgen sich um sie)?

   Answer format: 1 = gar nicht, 2 = kaum, 3 = ein wenig, 4 = ziemlich, 5 = sehr

   a) Menschen in meinem persönlichen Umfeld
   b) Deutschen
   c) Europäern
   d) Menschen auf der ganzen Welt
6. Wie betroffen fühlen Sie sich, wenn einer der folgenden Gruppen etwas Schlimmes passiert?

   Answer format: 1 = gar nicht, 2 = kaum, 3 = ein wenig, 4 = ziemlich, 5 = sehr

a) Menschen in meinem persönlichen Umfeld
b) Deutschen
c) Europäern
d) Menschen auf der ganzen Welt

7. Wie sehr möchten Sie Folgendes sein:

   Answer format: 1 = gar nicht, 2 = kaum, 3 = ein wenig, 4 = ziemlich, 5 = sehr

   a) ein verantwortungsvolles Mitglied in meinem persönlichen Umfeld
   b) ein verantwortungsvoller Bürger/eine verantwortungsvolle Bürgerin Deutschlands
   c) ein verantwortungsvoller Bürger/eine verantwortungsvolle Bürgerin Europas
   d) ein verantwortungsvoller Bürger/eine verantwortungsvolle Bürgerin der Welt
8. Wie wichtig ist es Ihnen,

   Answer format: 1 = gar nicht, 2 = kaum, 3 = ein wenig, 4 = ziemlich, 5 = sehr

   a) Ihrem persönlichen Umfeld gegenüber aufrichtig zu sein?
   b) gegenüber Deutschen aufrichtig zu sein?
   c) gegenüber Europäern aufrichtig zu sein
   d) gegenüber Menschen auf der ganzen Welt aufrichtig zu sein?
9. Wie sehr möchten Sie folgenden Gruppen helfen, wenn diese Hilfe benötigen?

   Answer format: 1 = gar nicht, 2 = kaum, 3 = ein wenig, 4 = ziemlich, 5 = sehr

   a) Menschen in meinem persönlichen Umfeld
   b) Deutschen
   c) Europäern
   d) Menschen auf der ganzen Welt

2.6 Perceived communicated distance of climate change in the news text

Instruction:
Wir möchten Sie nun bitten, sich den Artikel über den Klimawandel, den Sie
gelesen haben, noch einmal in Erinnerung zu rufen.
Wie stellt der Journalist das Thema „Klimawandel“ in dem Artikel dar? Es geht vor allem um…

Answer format: 7-point semantic differential

1. die Gegenwart … die Zukunft
2. Leute wie mich … andere Menschen
3. nahe Orte … ferne Orte
4. sichere Fakten … unsichere Meinungen
5. heutige Ereignisse … zukünftige Ereignisse
6. Ereignisse, die mich betreffen … Ereignisse, die andere betreffen
7. Ereignisse in der Nähe … Ereignisse in der Ferne
8. wahrscheinliche Ereignisse … unwahrscheinliche Ereignisse

Control items positioned here (severity, relevance)

1. harmlos … gefährlich
2. schwach … stark
3. unwichtig … wichtig

2.7 Contact with the climate change issue in the media

Wie häufig sind Sie in der Vergangenheit mit Berichten über den Klimawandel in Medien in Kontakt gekommen?

Answer format: 0 = nie, 1 = einmal im halben Jahr oder seltener, 2 = mehrmals im halben Jahr, 3 = einmal im Monat, 4 = mehrmals im Monat, 5 = mehrmals pro Woche

2.8 Awareness check

Instruction:
Zum Schluss interessiert uns Ihre Meinung zu dieser Studie (*offene Fragen*)

1. Was ist Ihrer Meinung nach das Ziel dieser Studie?
2. Gibt es etwas, das Ihnen besonders aufgefallen ist oder Sie irritiert hat?
3. Gibt es sonst noch etwas, das Sie uns gern mitteilen möchten (z.B. Meinung zum Thema, offene Fragen, etc.)?

3. Stimulus texts Study 2

3.1 News text communicating proximity of climate change[29]

29. März 2016, 16:18 Uhr

Was Forscher über den Klimawandel und seine Folgen in Deutschland wissen

Überschwemmung der Elbufer 2013: Hochwasserereignisse nehmen in Deutschland durch den Klimawandel zu

Gehäufte Unwetter, bisher ungewöhnliche Erkrankungen und Ressourcenverluste sind konkrete Auswirkungen des Klimawandels, die in Deutschland erwartet werden. Der Bericht des Weltklimarates legt die aktuellen Forschungsergebnisse und wahrscheinliche Szenarien unserer Zukunft dar.

Von S. Altmann

Um wie viel Grad hat sich die Erde bereits erwärmt und warum?

Von 1880 bis 2012 ist es auf der Erde um etwa 0,8 Grad wärmer geworden. Die zehn wärmsten Jahre seit Beginn systematischer Messungen fallen alle in die Zeit nach 1997. Bei einem einzelnen zu heißen Jahr könne man noch von einem Zufall ausgehen, sagt Jochem Marotzke, Direktor am Max-Planck-Institut für Meteorologie in Hamburg. "Aber diese Häufung heißer Jahre ist praktisch nicht mehr zu erklären ohne den Klimawandel."

Die Experten des Weltklimarates IPCC gehen davon aus, dass Menschen diesen Trend entscheidend beeinflussen. Durch das Verbrennen fossiler Energieträger wie Kohle, Öl und Gas sowie durch großflächige Entwaldung wird Kohlendioxid (CO_2) in der Atmosphäre angereichert. Land- und Viehwirtschaft verursachen Methan und Lachgas. Die Ansammlung dieser treibhauswirksamen Gase in der Atmosphäre führt zu einer Erwärmung der unteren Luftschichten.

Wie heiß könnte es werden?

Der Weltklimarat hat verschiedene Szenarien entwickelt, welche die Zukunft des Erdklimas beschreiben könnten. Im optimistischsten Fall steigt die Durchschnittstemperatur bis 2100 nur noch um ein halbes Grad, im Vergleich zur vorindustriellen Zeit wären es etwa 1,5 Grad. Das Szenario geht allerdings davon aus, dass die CO_2-Emissionen nur noch wenig zunehmen und von 2030 an stark abnehmen. Von 2070 an dürfte die Menschheit überhaupt keine Treibhausgase mehr freisetzen.

Das andere Extrem bildet eine sehr düstere Zukunftsvision: Kraftwerke, Fabriken und Autos stoßen in den kommenden Jahrzehnten immer mehr klimaschädliche Gase aus. Klimaschutzmaßnahmen beginnen erst nach 2050 langsam zu greifen. Im Jahr 2100 wird die Vier-Grad-Marke geknackt. Im Jahr 2150 wäre die Erde bereits um sieben Grad wärmer.

Momentan nehmen Jahr für Jahr die Treibhausgas-Emissionen um etwa zwei Prozent zu. 2013 gelangten 36 Milliarden Tonnen CO_2 in die Atmosphäre, gut 60 Prozent mehr als 1990. Politisches Ziel ist es, die Erderwärmung auf „weit unter zwei Grad" zu begrenzen.

Welche Folgen hat der Klimawandel für die Menschen in Deutschland?

Die entwickelten Szenarien der Forscher legen auch die Folgen des Klimawandels für Menschen in Deutschland dar. Extreme Hitzewellen werden häufiger. Die Wahrscheinlichkeit von Dürreperioden steigt. Gleichzeitig wächst die Zahl extrem milder Winter. Außerdem nehmen starke Niederschläge in vielen Gegenden zu und es kommt wahrscheinlich häufiger zu starken Stürmen.

Trendberechnungen gehen von zahlreicheren und stärkeren Hochwasserereignissen und dadurch bedingten Schäden für die Infrastruktur aus. Gleichzeitig werden aber auch Phasen, in denen Flüsse sehr wenig Wasser führen, länger und extremer. Weil Schadstoffe dann in höherer Konzentration vorliegen, reduziert sich die Wasserqualität. In Perioden großer Hitze oder Trockenheit besteht erhöhte Waldbrandgefahr.

Insgesamt schätzen Forscher die Klima-Vulnerabilität Deutschlands im Gesundheitsbereich als hoch ein. Es wird beispielsweise angenommen, dass die Hitzeperioden zu vermehrten Herz-Kreislauf-Erkrankungen mit häufigeren Todesfällen führen. Außerdem nehmen einige ungewöhnliche Krankheiten zu. Unangenehme Insekten finden hervorragende Bedingungen vor und übertragen in höherem Maße Infektionskrankheiten wie beispielsweise das Chikungunya-Fieber. Auch das sogenannte Hanta-Virus, welches schwere Lungen- und Nierenentzündungen hervorrufen kann, könnte sich weiter ausbreiten. Das Risiko einer erhöhten Feinstaubbelastung steigt.

Welche Folgen hat der Klimawandel für den Planeten?

Im 20. Jahrhundert ist der Meeresspiegel laut Weltklimarat um 19 Zentimeter gestiegen - mit hoher Wahrscheinlichkeit ist der Anstieg schneller als in den vorangegangenen zwei Jahrtausenden verlaufen. Je nach Szenario ist bis 2100 zwischen durchschnittlich 25 Zentimetern und einem Meter Anstieg alles denkbar. Grund dafür ist, dass die Arktis und Grönland im Sommer immer schneller Eis verlieren und weltweit Gletscher schrumpfen. Permafrostböden, die eine erhebliche Menge des Treibhausgases Methan speichern, tauen zunehmend.

Seit Beginn der Industrialisierung sind die Ozeane zum einen wärmer, zum anderen durch die Aufnahme von CO_2 saurer geworden. Dies gefährdet Korallenriffe und Meeresbewohner. Außerdem sind viele Pflanzen und Tiere an Land zunehmend vom Aussterben bedroht, wenn sie nicht in kältere Regionen abwandern können.

In welchem Zusammenhang stehen Klimawandel und Ressourcen?

Der Klimawandel kann negative Auswirkungen auf lebenswichtige Ressourcen haben. In Deutschland wirken sich beispielsweise die reduzierte Wasserqualität der Flüsse und die Veränderung der Meere negativ auf die Fischpopulation aus. Besonders Reis, Weizen und Mais, die aus tropischen Regionen auch nach Deutschland exportiert werden, macht der Klimawandel zu schaffen. Etwa ein Zehntel dieser Felder könnte im Zeitraum 2030 bis 2049 rund ein Viertel weniger Ertrag liefern, schätzen die Verfasser des IPCC-Berichts. Eine Erderwärmung um vier Grad oder mehr hätte wohl gravierende Auswirkungen auf die Ernährungssicherheit.

Wirkt sich der Klimawandel auf Konflikte aus?

Die G7-Außenminister warnen, der Klimawandel sei "eine der zentralen Sicherheitsbedrohungen des 21. Jahrhunderts". Sinkende Einkommensmöglichkeiten, unbewohnbare Rückzugsräume und Fragen des Ressourcenzugangs könnten "zu zwischenstaatlichen Spannungen, zum Zerfall von Staaten und Gesellschaften führen". Auch wenn der Klimawandel für derartige Konflikte nicht der alleinige Auslöser ist, dürften Maßnahmen gegen die Folgen des Klimawandels ein langfristiger Beitrag zum Frieden auch zwischen Deutschland und anderen Ländern sein.

Wie kann man auf den Klimawandel reagieren?

Mitigation bezieht sich auf Maßnahmen zur Reduktion der Treibhausgasemissionen, um den Klimawandel abzumildern. Beispielsweise kann man öfter mit öffentlichen Verkehrsmitteln fahren und weniger fliegen. Laut Umweltbundesamt erzeugt eine Flugreise in Deutschland bei gleicher Distanz etwa 5-mal so viel CO_2 wie eine Reise mit der Bahn und 7-mal so viel wie eine Busreise. Man kann seltener Fleisch essen. Bei der Produktion von Fleisch entsteht etwa die 30-fache Menge an Treibhausgasen im Vergleich zu der gleichen Menge Gemüse. Bei Rindfleisch sind die entstehenden Emissionen besonders hoch. Gemüse und Obst der Saison entsprechend aus der Region zu kaufen verringert Transportwege und energieintensive Kühlung (z.B. Tomaten von Juli bis Oktober und Erdbeeren von Mai bis Juli). Durch den Verzicht auf den Stand-by-Modus von Computer, Fernseher, Kaffeemaschine und Co. lassen sich pro Haushalt rund 100 Euro im Jahr einsparen. Würden alle Bundesbürger dies tun, wären dies über 22 Milliarden Kilowattstunden Strom: doppelt so viel wie Hamburg pro Jahr an Strom verbraucht.

Unter Adaptation versteht man die Anpassung von natürlichen und menschlichen Systemen an bereits bestehende und erwartete Klimaänderungen. Beispielsweise können kulturelle Gewohnheiten südlicher Länder auch in Deutschland übernommen werden, wie vermehrtes Trinken von Leitungswasser und eine Siesta zur Mittagszeit.

Viele Wissenschaftler befürchten, dass eine Begrenzung der Klimaerwärmung um 2°C überschritten werden wird, andere glauben an die Wandlungsfähigkeit der heutigen Lebensstile.

[29] Picture source (creative commons licence): https://pixabay.com/de/hochwasser-elbe-mei%C3%9Fen-notfall-not-876580/; text source: http://www.sueddeutsche.de/wissen/erderwaermung-was-forscher-ueber-den-klimawandel-wirklich-wissen-1.2757138

3.2 News text communicating distance of climate change[30]

29. März 2016, 16:18 Uhr

Was Forscher über den Klimawandel und seine globalen Folgen wissen

Überschwemmung in Thailand 2013: Hochwasserereignisse nehmen vor allem in Entwicklungsländern durch den Klimawandel zu

Gehäufte Unwetter, bisher ungewöhnliche Erkrankungen und Ressourcenverluste sind konkrete Auswirkungen des Klimawandels, die vor allem in Entwicklungsländern erwartet werden. Der Bericht des Weltklimarates legt die aktuellen Forschungsergebnisse und wahrscheinliche Szenarien der globalen Zukunft dar.

Von S. Altmann

Um wie viel Grad hat sich die Erde bereits erwärmt und warum?

Von 1880 bis 2012 ist es auf der Erde um etwa 0,8 Grad wärmer geworden. Die zehn wärmsten Jahre seit Beginn systematischer Messungen fallen alle in die Zeit nach 1997. Bei einem einzelnen zu heißen Jahr könne man noch von einem Zufall ausgehen, sagt Jochem Marotzke, Direktor am Max-Planck-Institut für Meteorologie in Hamburg. "Aber diese Häufung heißer Jahre ist praktisch nicht mehr zu erklären ohne den Klimawandel."

Die Experten des Weltklimarates IPCC gehen davon aus, dass Menschen diesen Trend entscheidend beeinflussen. Durch das Verbrennen fossiler Energieträger wie Kohle, Öl und Gas sowie durch großflächige Entwaldung wird Kohlendioxid (CO_2) in der Atmosphäre angereichert. Land- und Viehwirtschaft verursachen Methan und Lachgas. Die Ansammlung dieser treibhauswirksamen Gase in der Atmosphäre führt zu einer Erwärmung der unteren Luftschichten.

Wie heiß könnte es werden?

Der Weltklimarat hat verschiedene Szenarien entwickelt, welche die Zukunft des Erdklimas beschreiben könnten. Im optimistischsten Fall steigt die globale Durchschnittstemperatur bis 2100 nur noch um ein halbes Grad, im Vergleich zur vorindustriellen Zeit wären es etwa 1,5 Grad. Das Szenario geht allerdings davon aus, dass die CO_2-Emissionen nur noch wenig zunehmen und von 2030 an stark abnehmen. Von 2070 an dürfte die Menschheit überhaupt keine Treibhausgase mehr freisetzen.

Das andere Extrem bildet eine sehr düstere Zukunftsvision: Kraftwerke, Fabriken und Autos stoßen in den kommenden Jahrzehnten immer mehr klimaschädliche Gase aus. Klimaschutzmaßnahmen beginnen erst nach 2050 langsam zu greifen. Im Jahr 2100 wird die Vier-Grad-Marke geknackt. Im Jahr 2150 wäre die Erde bereits um sieben Grad wärmer.

Momentan nehmen Jahr für Jahr die Treibhausgas-Emissionen um etwa zwei Prozent zu. 2013 gelangten 36 Milliarden Tonnen CO_2 in die Atmosphäre, gut 60 Prozent mehr als 1990. Politisches Ziel ist es, die Erderwärmung auf „weit unter zwei Grad“ zu begrenzen.

Welche Folgen hat der Klimawandel für die Menschen?

Die entwickelten Szenarien der Forscher legen auch die Folgen des Klimawandels dar. Sie betreffen vor allem Menschen in Entwicklungsländern. Extreme Hitzewellen werden häufiger. Die Wahrscheinlichkeit von Dürreperioden steigt. Gleichzeitig wächst die Zahl extrem milder Winter. Außerdem nehmen starke Niederschläge in vielen Gegenden zu und es kommt wahrscheinlich häufiger zu starken Stürmen.

Trendberechnungen gehen von zahlreicheren und stärkeren Hochwasserereignissen und dadurch bedingten Schäden für die Infrastruktur aus. Gleichzeitig werden aber auch Phasen, in denen Flüsse sehr wenig Wasser führen, länger und extremer. Weil Schadstoffe dann in höherer Konzentration vorliegen, reduziert sich die Wasserqualität. In Perioden großer Hitze oder Trockenheit besteht erhöhte Waldbrandgefahr.

Insgesamt schätzen Forscher die globale Klima-Vulnerabilität im Gesundheitsbereich als hoch ein. Es wird beispielsweise angenommen, dass die Hitzeperioden zu vermehrten Herz-Kreislauf-Erkrankungen mit häufigeren Todesfällen führen. Außerdem nehmen einige ungewöhnliche Krankheiten zu. Unangenehme Insekten finden hervorragende Bedingungen vor und übertragen in höherem Maße Infektionskrankheiten wie beispielsweise das Chikungunya-Fieber. Auch das sogenannte Hanta-Virus, welches schwere Lungen- und Nierenentzündungen hervorrufen kann, könnte sich weiter ausbreiten. Das Risiko einer erhöhten Feinstaubbelastung steigt.

Welche Folgen hat der Klimawandel für den Planeten?

Im 20. Jahrhundert ist der Meeresspiegel laut Weltklimarat um 19 Zentimeter gestiegen - mit hoher Wahrscheinlichkeit ist der Anstieg schneller als in den vorangegangenen zwei Jahrtausenden verlaufen. Je nach Szenario ist bis 2100 zwischen durchschnittlich 25 Zentimetern und einem Meter Anstieg alles denkbar. Grund dafür ist, dass die Arktis und Grönland im Sommer immer schneller Eis verlieren und weltweit Gletscher schrumpfen. Permafrostböden, die eine erhebliche Menge des Treibhausgases Methan speichern, tauen zunehmend.

Seit Beginn der Industrialisierung sind die Ozeane zum einen wärmer, zum anderen durch die Aufnahme von CO_2 saurer geworden. Dies gefährdet Korallenriffe und Meeresbewohner. Außerdem sind viele Pflanzen und Tiere an Land zunehmend vom Aussterben bedroht, wenn sie nicht in kältere Regionen abwandern können.

In welchem Zusammenhang stehen Klimawandel und Ressourcen?

Der Klimawandel kann negative Auswirkungen auf lebenswichtige Ressourcen haben. Weltweit wirken sich beispielsweise die reduzierte Wasserqualität der Flüsse und die Veränderung der Meere negativ auf die Fischpopulation aus. Besonders Reis, Weizen und Mais in tropischen Regionen macht der Klimawandel zu schaffen. Etwa ein Zehntel dieser Felder könnte im Zeitraum 2030 bis 2049 rund ein Viertel weniger Ertrag liefern, schätzen die Verfasser des IPCC-Berichts. Eine Erderwärmung um vier Grad oder mehr hätte wohl gravierende Auswirkungen auf die Ernährungssicherheit.

Wirkt sich der Klimawandel auf Konflikte aus?

Die G7-Außenminister warnen, der Klimawandel sei "eine der zentralen Sicherheitsbedrohungen des 21. Jahrhunderts". Sinkende Einkommensmöglichkeiten, unbewohnbare Rückzugsräume und Fragen des Ressourcenzugangs könnten "zu zwischenstaatlichen Spannungen, zum Zerfall von Staaten und Gesellschaften führen". Auch wenn der Klimawandel für derartige Konflikte nicht der alleinige Auslöser ist, dürften Maßnahmen gegen die Folgen des Klimawandels ein langfristiger Beitrag zum weltweiten Frieden sein.

Wie kann man auf den Klimawandel reagieren?

Mitigation bezieht sich auf Maßnahmen zur Reduktion der Treibhausgasemissionen, um den Klimawandel abzumildern. Beispielsweise kann man öfter mit öffentlichen Verkehrsmitteln fahren und weniger fliegen. Laut Umweltbundesamt erzeugt eine Flugreise in Deutschland bei gleicher Distanz etwa 5-mal so viel CO_2 wie eine Reise mit der Bahn und 7-mal so viel wie eine Busreise. Man kann seltener Fleisch essen. Bei der Produktion von Fleisch entsteht etwa die 30-fache Menge an Treibhausgasen im Vergleich zu der gleichen Menge Gemüse. Bei Rindfleisch sind die entstehenden Emissionen besonders hoch. Gemüse und Obst der Saison entsprechend aus der Region zu kaufen verringert Transportwege und energieintensive Kühlung (z.B. Tomaten von Juli bis Oktober und Erdbeeren von Mai bis Juli). Durch den Verzicht auf den Stand-by-Modus von Computer, Fernseher, Kaffeemaschine und Co. lassen sich pro Haushalt rund 100 Euro im Jahr einsparen. Würden alle Bundesbürger dies tun, wären dies über 22 Milliarden Kilowattstunden Strom: doppelt so viel wie Hamburg pro Jahr an Strom verbraucht.

Unter Adaptation versteht man die Anpassung von natürlichen und menschlichen Systemen an bereits bestehende und erwartete Klimaänderungen. Beispielsweise können kulturelle Gewohnheiten südlicher Länder auch im Norden übernommen werden, wie vermehrtes Trinken von Leitungswasser und eine Siesta zur Mittagszeit.

Viele Wissenschaftler befürchten, dass eine Begrenzung der Klimaerwärmung um 2°C überschritten werden wird, andere glauben an die Wandlungsfähigkeit der heutigen Lebensstile.

[30] Picture source (creative commons licence): https://commons.wikimedia.org/wiki/File:VOA_-_Thailand_Grapples_With_Worst_Flooding_in_50_Years_-_06.jpg?uselang=de; text source: http://www.sueddeutsche.de/wissen/erderwaermung-was-forscher-ueber-den-klimawandel-wirklich-wissen-1.2757138

4. Stimulus texts Study 3

4.1 News text communicating proximity of climate change[31]

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.

[31] 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

4.2 News text communicating distance of climate change[32]

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

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

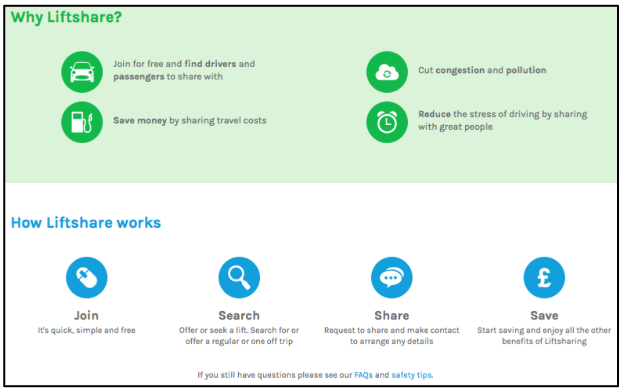
Many activities involving electricity can be conducted more consciously. By switching things off rather than leaving things on standby, e.g. computers, TVs, coffee machines, British households can save around £80 on a bill of £500 according to a study conducted by the Energy Saving Trust. Phones and 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.

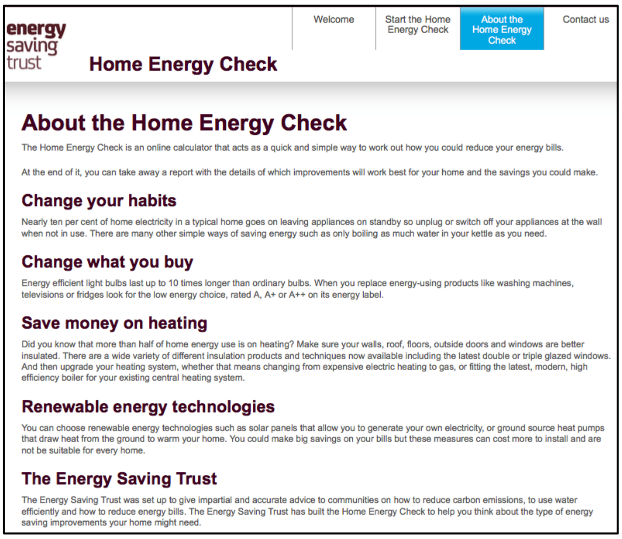
People could also think about climate change impacts when buying food. Buying seasonal vegetables and fruits reduces transport emissions and energy intensive cooling (e.g. tomatoes between June and October; strawberries between June and September; apples, beetroot or cabbage in the winter months). It 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.

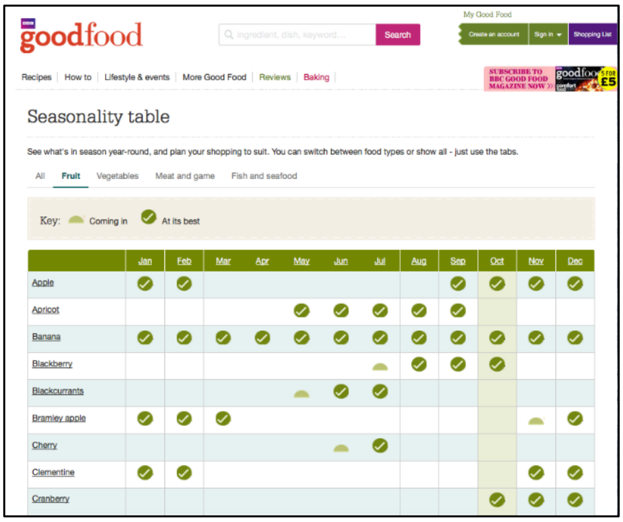
Finally, political or social engagement such as taking part in campaigns, supporting policy measures or simply talking to others about climate change can help to create a more sustainable society and encourage others to also take action. Many scientists fear that a limitation of global warming to 1.5°C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

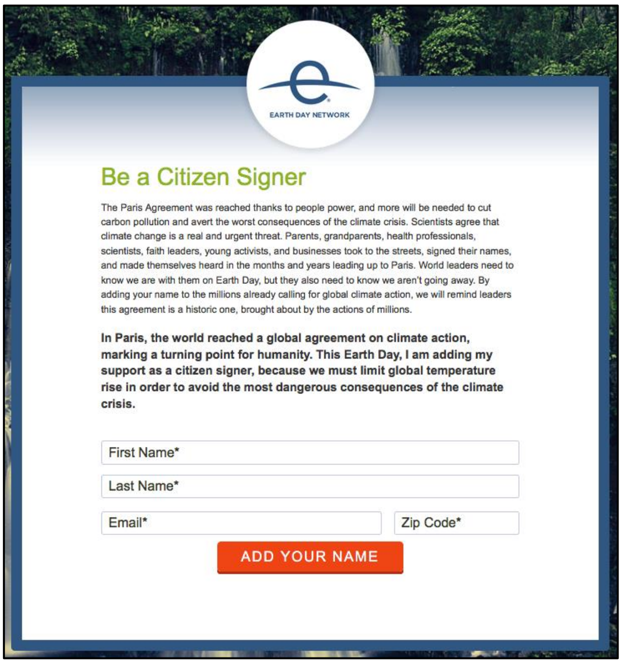
[32] Picture source (creative commons licence): https://commons.wikimedia.org/wiki/File:Brahmaputra_Plains_in_Goalpara_District_of_Assam_857.jpg; ; text sources: http://www.sueddeutsche.de/wissen/erderwaermung-was-forscher-ueber-den-klimawandel-wirklich-wissen-1.2757138; https://www.bbc.com/news/science-environment-24021772;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

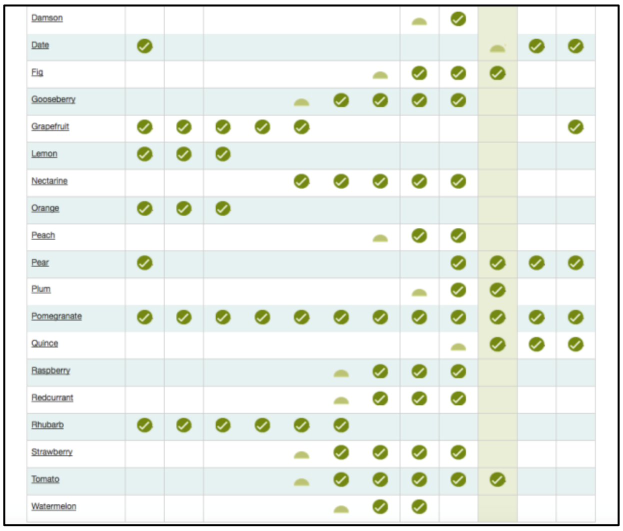
5. Screenshots information behaviour measure Study 3[33]











[33] 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

Curriculum Vitae

Laura S. Loy

Geburtsdatum: 31.08.1984 in Regensburg

Ausbildung

03/2014 – heute	**Doktorandin** Institut für Kommunikationswissenschaft, Universität Hohenheim Dissertation: *"Communicating climate change. How proximising climate change and global identity predict engagement"* (Betreuerin: Prof. Dr. Sabine Trepte; Fachgebiet Medienpsychologie)
10/2005 – 03/2012	**Diplom in Psychologie** Universität Konstanz Diplomarbeit: *„Can Mental Contrasting with Implementation Intentions (MCII) promote sustainable food consumption?"* (Gutachter: Dr. Frank Wieber, Prof. Dr. Peter M. Gollwitzer; Lehrstuhl für Sozialpsychologie und Motivation)
11/2010 – 10/2011	**Basisausbildung Systemische Beratung** Institut für Systemische Beratung Wiesloch (ISB)
10/2008 – 07/2009	**Studium der Psychologie (Erasmusstipendium)** Universität Padua, Italien
10/2004 – 03/2005	**Studium der Italianistik und vergleichenden Kulturwissenschaft** Universität Regensburg
09/1991 – 06/2004	**Abitur** Albrecht-Altdorfer-Gymnasium Regensburg, Grundschule Regenstauf

Berufliche Tätigkeiten

03/2013 – 03/2018	**Wissenschaftliche Mitarbeiterin am Lehrstuhl für Medienpsychologie** (Prof. Dr. Sabine Trepte) Institut für Kommunikationswissenschaft, Universität Hohenheim
02/2016 – 07/2016	**Wissenschaftliche Hilfskraft am Lehrstuhl für Klinische & Biologische Psychologie, Universität Ulm** (Prof. Dr. Iris-Tatjana Kolassa) Institut für Psychologie, Universität Ulm
04/2012 – 03/2013	**Wissenschaftliche Mitarbeiterin am Lehrstuhl für Persönlichkeits- & Sozialpsychologie** (Prof. Dr. Florian Kaiser) Institut für Psychologie, Otto-von-Guericke-Universität Magdeburg
11/2010 – 06/2011	**Wissenschaftliche Hilfskraft am Lehrstuhl für Arbeits- & Organisationspsychologie** (Prof. Dr. Cornelia Niessen) Fachbereich Psychologie, Universität Konstanz
04/2010 – 05/2010	**Praktikantin am Institut für ökologische Wirtschaftsforschung (IÖW), Berlin** (Betreuer: Dr. Siegmar Otto, Dr. Gerd Scholl)
10/2009 – 03/2010	**Praktikantin in der Zentraleinrichtung Studienberatung & Psychologische Beratung** (Betreuer: Dipl.-Psych. Hans-Werner Rückert) Freie Universität Berlin

11/2007 – 02/2008 **Wissenschaftliche Hilfskraft am Lehrstuhl für Diagnostik & Gesundheitspsychologie** (Prof. Dr. Britta Renner)
Fachbereich Psychologie, Universität Konstanz

03/2007 – 09/2007 **Wissenschaftliche Hilfskraft am Lehrstuhl für Entwicklungspsychologie & Kulturvergleich** (Prof. Dr. Gisela Trommsdorff)
Fachbereich Psychologie, Universität Konstanz

Drittmittel

2017 Reisestipendium des DAAD für die Konferenz der International Communication Association (ICA) in San Diego, USA (€1.880)

2016 Stipendium des DAAD für einen 10-wöchigen Forschungsaufenthalt an der School of Psychology, University of Nottingham, bei Prof. Dr. Alexa Spence (€3.250)

2014 Reisestipendium des DAAD für die Konferenz der International Communication Association (ICA) in Seattle, USA (€1.400)

2014 Preisträgerin des Hochschulwettbewerbs 2014 durchgeführt von Wissenschaft im Dialog, gefördert durch das Bundesministerium für Bildung und Forschung, mit einem Projekt zur Entwicklung eines Online-Tools zur Förderung politischen Wissens bei Jugendlichen zusammen mit Josephine B. Schmitt und den Masterstudentinnen Carmen Prochnow und Mona Fischer (€10.000)

2014 Projekt zu politischem Wissen und Medienkompetenz finanziert durch die Bundeszentrale für politische Bildung zusammen mit Josephine B. Schmitt und Sabine Trepte (€16.000)

Lehre

2017 Seminar zu Nachhaltigkeitskommunikation aus medienpsychologischer Perspektive (BA Kommunikationswissenschaft)
Seminar zur Entwicklung medienpsychologischer Workshops für Schulklassen (MA Kommunikationswissenschaft & Medienforschung, MA Kommunikationsmanagement)

2016 Englischsprachiges Seminar zu Sustainability communication from a media psychological perspective (BA Kommunikationswissenschaft)
Seminar zur Entwicklung medienpsychologischer Workshops für Schulklassen (MA Kommunikationswissenschaft & Medienforschung, MA Kommunikationsmanagement)

2015 Seminar zur Nachhaltigkeitskommunikation aus medienpsychologischer Perspektive (BA Kommunikationswissenschaft)
Forschungsseminar Nachhaltigkeitskommunikation (MA Kommunikationswissenschaft & Medienforschung, MA Kommunikationsmanagement)

2014 Zweimal Seminar zu Work Life Balance am Lehrstuhl Wirtschafts- & Organisationspsychologie (BA Wirtschaftswissenschaften, Wirtschaftspädagogik)

2013 Seminar zu Medien und politischem Wissen (BA Kommunikationswissenschaft)
Forschungsseminar zum Einfluss von Medien auf Beziehungen (MA Kommunikationsmanagement)

2012 Experimentalpraktikum zu Primingeffekten auf Verhalten (BA Psychologie)
Übung Sozialpsychologie (BA Psychologie)

Publikationen

Loy, L. S., Masur, P. M., Schmitt, J. B., & Mothes, C. (2018). Psychological predictors of political Internet use and political knowledge in light of the perceived complexity of political issues. *Information, Communication & Society*, 1-18. doi: 10.1080/1369118X.2018.1450886

Fissler, P., Küster, O. C., Loy, L. S., Laptinskaya, D., Rosenfelder, M. J., von Arnim, C. A. F., & Kolassa, I.-T. (2017). Jigsaw Puzzles as Cognitive Enrichment (PACE) – the effect of solving jigsaw puzzles on global visuospatial cognition in adults 50 years of age and older: Study protocol for a randomized controlled trial. *Trials, 18*(1), 1-11. doi: 10.1186/s13063-017-2151-9

Bauer, A. A., Loy, L. S., Masur, P. K., & Schneider, F. M. (2017). Mindful instant messaging. Mindfulness and autonomous motivation as predictors of well-being in smartphone communication. *Journal of Media Psychology, 29*(3), 159–165. doi: 10.1027/1864-1105/a000225

Trepte, S. & Loy, L. S. (2017). Social identity theory and self-categorization theory. In P. Roessler, C. A. Hoffner, & van Zoonen, L. (Eds.), *The International Encyclopaedia of Media Effects* (p. 1-13). doi: 10.1002/9781118783764.wbieme0088

Trepte, S., Loy, L. S., Schmitt, J. B., & Otto, S. (2017). HIP: Das Hohenheimer Inventar zum Politikwissen – Konstruktion und Skalierung. *Diagnostica. 63*(3), 206-218. doi: 10.1026/0012-1924/a000180

Loy, L. S., Wieber, F., Gollwitzer, P. M., & Oettingen, G. (2016). Supporting sustainable food consumption: Mental Contrasting with Implementation Intentions (MCII) aligns intentions and behavior. *Frontiers in Psychology. 7*(607), 1-12. doi: 10.3389/fpsyg.2016.00607

Loy, L. S., Kaiser, F. G., Woelki, D., Hentschke, L. (2013). *Individuelle Anpassung an den Klimawandel: Soziale Einflüsse im Vergleich - Teil II*. Forschungsbericht für das Ministerium für Landwirtschaft und Umwelt, Sachsen-Anhalt.

Vorträge

Loy, L. S. (2017, November). *Berufsfeld Medienpsychologie*. Eingeladener Vortrag im Rahmen der Reihe "Berufsperspektiven für PsychologInnen", Universität Konstanz.

Loy, L. S. & Spence, A. (2017, September). *Proximising climate change in media communication*. Presentation at the 10th conference of the media psychology division of the German Psychological Association (DGPs), Landau (Germany).

Loy, L. S. & Spence, A. (2017, September). *Bridging the distance of climate change communication*. Presentation at the International Conference on Environmental Psychology, A Coruna (Spain).

Loy, L. S. (2017, Mai). *Sowas von übermorgen. Nachhaltige Mobilität auf Basis psychologischer Erkenntnisse kommunizieren.* Eingeladener Vortrag im Rahmen des Workshops "Kommunikationsstrategien einer nachhaltigen Mobilitätskultur", Internationales Zentrum für Kultur- und Technikforschung, Universität Stuttgart.

Loy, L. S. & Spence, A. (2017, Mai). *Bridging the distance of climate change communication.* Presentation at the 66th annual conference of the International Communication Association, San Diego (USA).

Loy, L. S. (2016, Oktober). *Bridging the distance of climate change communication*. Presentation in the research colloquium of the Personality, Social Psychology, and Health research group, Department of Psychology, University of Nottingham (UK).

Loy, L. S., Masur, P. K., Schmitt, J. B., Mothes, C., & Trepte, S. (2016, Juni). *Politically informed in a complex world? Time affluence, informational self-efficacy, and need for cognition as predictors of political media use and political knowledge.* Presentation at the 65th annual conference of the International Communication Association, Fukuoka (Japan).

Loy, L. S., & Bauer, A. (2016, Juni). *Stressed by smartphone use? The interplay of intrinsic motivation and mindfulness during instant messaging.* Presentation at the 65th annual conference of the International Communication Association, Fukuoka (Japan).

Loy, L. S.; Schmitt, J. B.; Otto, S.; Trepte, S. (2015, September). *HIP: Hohenheimer Inventar zum Politikwissen - Konstruktion und Raschskalierung.* Presentation at the 9th conference of the methods & evaluation division of the German Psychological Association (DGPs), Jena (Germany).

Schmitt, A. M. R., Loy, L. S., & Schmitt, J. B. (2015, September). *Political media outlets for a young audience – strengths, weaknesses, and potentials.* Presentation at the 9th conference of the media psychology division of the German Psychological Association (DGPs), Tübingen (Germany).

Schmitt, J. B., Loy, L. S., & Trepte, S. (2015, Juni). *Birds of a feather make us remember better: Predicting factual news knowledge by recipients' similarity to news protagonists and post-exposure discussion quality.* Poster at the 64th annual conference of the International Communication Association, Seattle (USA).

Loy, L. S. (2015, Januar). *Die Wirkung medial vermittelter Distanz in der Nachhaltigkeitskommunikation.* Präsentation auf der Konferenz "Qualitäten der Nachhaltigkeitskommunikation", Berlin (Germany).

Loy, L. S., Wieber, F., Gollwitzer, P. M., & Oettingen, G. (2014, September). *A self-regulation intervention to support the enactment of sustainable consumer intentions: Mental Contrasting with Implementation Intentions (MCII).* Presentation at the 49th conference of the German Psychological Association (DGPs), Bochum (Germany).

Loy, L. S. (2014, Juli). *The psychological distance of global news.* Presentation at the SoDoc-workshop of the social psychology division of the German Psychological Association, Friedrichshafen (Germany).

Loy, L. S. (2014, Mai). *Transcending the psychological distance of global news.* Presentation at the PhD workshop of the political communication division, 64th annual conference of the International Communication Association, Seattle (USA).

Schmitt, J. B., Loy, L. S., & Hefner, D. (2014, Januar). *Politische Diskussion in realen Interaktionen: Experimentelle und inhaltsanalytische Ansätze.* Presentation and workshop at the conference of the media reception & effects division of the German association for communication science (DGPuK), Hannover (Germany).

Loy, L. S. (2013, September). *Transcending the psychological distance of global climate change.* Presentation at the PhD-workshop of the 8th Conference of the media psychology division of the German Psychological Association (DGPs), Würzburg (Germany).