Climate Change, Information, Beliefs and Action: Can new information affect Swedes' climate change mitigation efforts?

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Abstract

This study illuminates which beliefs drive climate mitigation efforts in the Swedish public and how they are affected by information. Using data gathered in an online experiment (n=372), this study finds that a range of beliefs predict Swedes' climate mitigation efforts. Mainly, it finds that the impact of correcting misperceptions about either Sweden's emissions or social norms is both varied and limited. Information about Sweden's emissions has a negative impact on climate policy support. This effect is not fully explained by some respondents perceiving the information as lacking in credibility. Information about norms has a positive impact on respondents self-estimated willingness to sacrifice more to fight climate change.

Keywords

1. Introduction

1.1 Introduction

Swedish citizens hold themselves in high regard when it comes to the fight against climate change. Swedes' view of their society's efforts against climate change is the highest among nine advanced European economies featured in a 2021 PEW-poll, ranking third globally behind Singapore and New Zealand (Pew Research Center, 2021, 15)[1]. Another recent survey, conducted by the EU, indicated that 31% of Swedes think their government is doing "too much" or "enough" to tackle climate change, compared to the EU average of 22% (EU, 2021). A related poll result showed that the proportion of Swedes opposed to Sweden implementing stricter climate measures has increased from 3% in 2008 to 14% in 2021 (Naturvårdsverket, 2021a, 7).

These findings do not align especially well with Sweden's actual efforts in relation to the 1.5°C goal[2]. Sweden's current per capita emissions are, despite some progress, about nine times higher than the required world average for reaching the 1.5°C goal (Naturvårdsverket, 2021b). The aforementioned survey results could therefore be indicative of a widening gap between Swedes' actual and perceived climate change mitigation efforts. For a democracy like Sweden to act against climate change, knowing to what extent citizens are informed about their country's efforts in relation to the 1.5°C goal, and how such knowledge may affect citizens' climate change mitigation efforts, is undoubtedly of great importance.

This paper will explore the link between beliefs and climate action among the Swedish population. The main research question is formulated as follows: How do two types of information affect climate mitigation efforts among people living in Sweden? The two types of information relate to: Sweden's actual emissions, in relation to the 1.5°C goal and the percentage of Swedes who say they favor stricter climate measures.

To answer the research question, data is gathered in an online survey experiment (n=372). The analysis consists in three steps: (1) examining what beliefs and factors motivate individual climate mitigation efforts, (2) documenting whether or not people living in Sweden are misinformed about their country's actual climate mitigation efforts and mainly, (3) investigating how correcting misinformed beliefs with information may affect such efforts.

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[1] The advanced economies included in this study were: Sweden, UK, Spain, Germany, France, Netherlands, Greece, Belgium, Italy, Canada, U.S, Singapore, New Zealand, Australia, Japan, South Korea, Taiwan

[2] The 1.5°C goal consists in limiting global warming to 1.5°C (UN, 2021b)

1.2 Research purpose

This study adds to the expanding research on how beliefs affect behavior. More specifically, it furthers the ongoing research on how certain beliefs affect climate mitigation efforts and what the effects are of having those beliefs challenged by new information. Establishing what role information can play in the fight against climate change is a task both urgent and relevant for society. This study makes two new contributions to the research on information provision and climate change mitigation. First, it analyzes the impact of information about social norms on climate change mitigation efforts in a current Swedish (or European) context. Second, it introduces a new type of information treatment which informs the subjects of how much one's country's per capita emissions need to be reduced in order to be compatible with the 1.5°C goal.

Furthermore, this study will also contribute with new knowledge about what individual beliefs and factors are at play in determining support for climate policies. To my knowledge, this has not been done before in the present Swedish context, a country that stands out by having high perceived climate mitigation efforts. The results in this study may provide future guidance regarding the impact similar information interventions can have in countries where the public opinion is similar to what the opinion currently looks like in Sweden.

1.3 Background

Climate change is becoming increasingly tangible for people all over the world. Those that have not been directly affected by higher temperatures or other alarming weather conditions have witnessed the proliferation of concerns amongst states and politicians. Especially so in the wake of the recent climate meeting in Glasgow, where new efforts were made to limit global warming to 1.5°C by the end of the century (UN, 2021a). The 1.5°C goal requires that the world has net-zero greenhouse gas (GHG) emissions by 2050 and that emissions are reduced by 45% until 2030 (UN, 2021b).

Yet, however vital the fulfillment of the 1.5°C goal is, it is nevertheless ambitious. Striving toward 1.5°C will entail impractical consequences for some states, as well as for their citizens' everyday lives, since greenhouse gas emissions need to be drastically reduced within a short time frame (Rogelj et al., 2016, Raftery et al., 2017). Precisely what further measures will be necessary and what sacrifices citizens are willing to put up with remains to be seen.

Though climate change is taken seriously in many countries, public opinion on one's country's efforts and how many personal sacrifices citizens are willing to make to fight climate change vary (Pew Research Center, 2021). As stated in the

introduction, Swedish citizens have a relatively high opinion[3] of their own climate change mitigation efforts. This is so despite Sweden having per capita emissions far from the 1.5°C goal required world average along with the rest of the EU[4] and most other developed countries (Our World in Data, 2020). If there exists such a "knowledge gap" between Swedish citizens actual and perceived climate change mitigation efforts, obtaining new information about the actual state of affairs may have an impact on Swedes' decisions both in the private and political sphere.

1.3.1 Information, beliefs, and decisions

Finding and measuring the impact of "knowledge gaps" is of interest for social scientists since they matter both for individual decisions as well as in democratic discourse and policy support (Haaland et al., 2020, Diamond et al., 2020). However, what actual impact mere information can have on decisions, especially when it comes to policy support, is a contested subject (Diamond et al., 2020).

Studying how people make decisions in the private and political realm is a central aspect within the field of economics. Standard economic theories normally understand decisions by looking at various factors, among which are information and beliefs. In economic experiments, one often attempts altering one of these factors for a given subgroup to see what effect it may have on their decision (Haaland et al., 2020, 1).

According to the Bayesian model of information processing, individuals aim to have accurate beliefs and thereby update them after receiving credible and relevant information (Diamond et al., 2020, Slovic & Lichtenstein, 1971). The model states that for belief updating to occur, the individuals already held (or "prior") beliefs must both conflict with the newly received information as well as weakly held (Bullock, 2009). Thus, if an individual has a strongly held prior belief, they might not update their belief on basis of receiving new information.

1.3.2 Information provision experiments

Information provision experiments have been used to study how some particular piece of information might affect an agent's choices or belief formation. A common way to perform information provision experiments is by presenting some piece of factual information to a subgroup of participants in an experiment. This piece of

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[3] A contributing factor to this could be the often-cited statistic on territorial emissions per capita, where Sweden ranks below the world average (Our World in Data, 2021). The territorial statistic omits emissions that occur elsewhere through Swedish consumption. Sweden is in fact one of EU's top three importers of Co2, with around 65% of domestic emissions being embedded in trade (Our World in Data, 2020)

[4] Sweden's consumption based Co2 emissions are somewhat lower than the EU-28 average. Sweden's yearly consumption based Co2 emissions per capita in 2019 were 6.76 tonnes Co2 per capita and the EU-28 average 7.74 tonnes Co2 per capita (Our World in Data, 2020). Note: Co2, not GHG.

information may challenge subjects' prior beliefs about how they perceive the world. A control group receives no information, thereby creating variation in the information subjects have access to (Haaland et al., 2020). As an example, in a study by Grigorieff et al (2020) participants in the US estimated the percentage of unemployed immigrants. A number of participants were informed of the true percentage and the effect of this message was then measured on variables such as participants' level of support for immigration policies or their beliefs about certain immigrant characteristics.

The type of information utilized in information experiments varies. A common way is to present factual information that likely challenges the respondents' descriptive perception of the world. For instance, this can be done with a scientific message, e.g., Diamond et al. (2020) or by presenting demographic facts, e.g., Grigorieff et al. (2020).

Another common type of facts utilized in information provision experiments are those that aim to target subjects' normative beliefs, i.e., beliefs that relate to how subjects' think they ought to behave. Stating for instance, what percentage of people act in a certain way or hold some particular attitude might affect the perceived normative expectations put on the individual by their societal context (Bicchieri & Dimant, 2019, Andre et al., 2021). Such interventions (or "norm-nudges") only work however, if the targeted attitude or behavior is conditional on what others think and do. The others that are referred to in such interventions, such as neighbors or compatriots, must be viewed as being part of the same "network" as the subject defines themselves as being a part of (Bicchieri & Dimant, 2019). Some examples follow in the literature review below.

1.4 Literature review

This section provides a brief introduction of relevant studies that have analyzed the impact of information on beliefs and behavior or policy preferences, generally or in relation to the issue of climate change.

In a well-known study, Alesina et al. (2018) show how information about intergenerational mobility affects subjects' preferences for redistribution in France, Italy, Sweden, the UK, and the US. They found that presenting information that is pessimistic about intergenerational mobility increases support for redistributive policies, especially so for subjects who identify as politically left wing. Another recent example is Settele & Shupe (2021) analyzing how the perceived tradeoffs between human lives and economic benefit affect support for stricter lockdown measures during the covid-19 pandemic.

A great number of studies have investigated the impact of providing information about prevalent social behavior, opinions, and norms. For instance, Bursztyn et al. (2020) found that young married men in Saudi Arabia greatly

underestimate the number of other similarly aged men that are in favor of women working outside the home. By providing subjects with the actual percentage of young men who favor women working outside the home, it increased their willingness to help their wives in joining the labor market. In another well-known study, Allcott (2011) showed that by informing US households of how their own power usage stands in relation to their neighbors, they reduced their electricity consumption similar to what a 11-20% price increase would have.

More recent studies have also looked at the impact of scientific and social information on climate mitigation efforts specifically. In a yet unpublished study, Andre et al. (2021) found that the US public underestimates the percentage of other Americans in favor of fighting climate change. The subjects that were informed of the actual percentages increased both their willingness to donate to a climate charity as well as their support for climate change mitigation policies. They also found economic and moral preferences such as altruism and universalism significant in determining willingness to fight climate change. In another study, Diamond et al. (2020) demonstrated a significant impact on support for evidence-based environmental policies by providing scientific information to subjects in Germany and the US. Hobman & Ashworth (2013) performed an experiment on the Australian public and found that factual information about generation cost and emissions changed subjects' support for various energy sources.

2. Method

This section will explain how the study was carried out as well as how the variables were measured.

The data used was gathered in an experiment carried out in the form of an online survey. To study what beliefs and other factors may influence climate change mitigation efforts, a wide range of variables were taken into account. These are to some extent based on variables utilized or found significant in an unpublished study by Andre et al. (2021), studying the influence of social norms on willingness to fight climate change.

2.1 Sample

Data was obtained from 439 people living in Sweden through an online survey in December 2021. 49 respondents were eliminated from the sample due to missing data about either income, political preference, or gender, due to these later being used as control variables. An additional 18 respondents were removed for failing the attention screener question, leaving a total sample of n=372 respondents.

The requirements to take part in the survey were to be living in Sweden and at least 18 years of age. Participants were recruited through Lund University entry
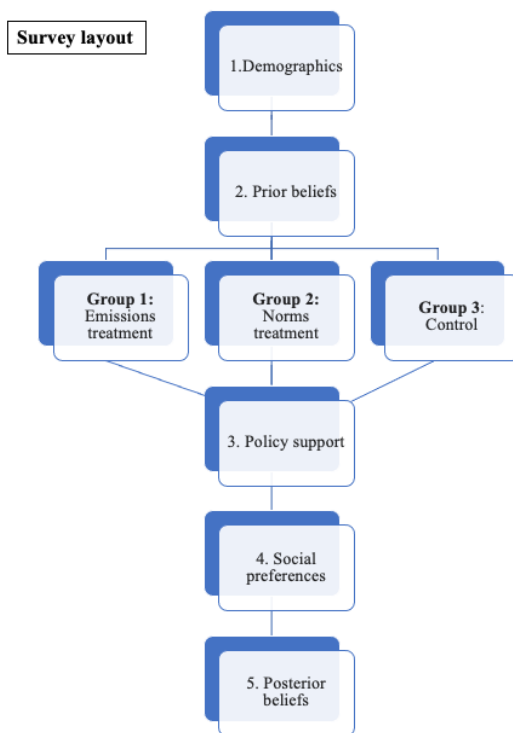
level economics course pages as well as various Facebook groups for people residing in the Malmö, Gothenburg, or Jönköping area. After collection, the data was organized using Microsoft Excel and the analysis carried out in Eviews 12.

2.2 Survey layout

This section will present a simplified[5] layout of the survey[6]. The following sections will then explain the main variables and measurements in greater detail.

The survey was designed using Google Forms and contained 5 sections, or 6 for those who received an information treatment. The order can be seen in the "Survey layout" image below. The survey was identical for all respondents except for the differing information treatments received by Group 1 and Group 2. Group 3, the control group, received no information and immediately proceeded to section 3 after finishing section 2.

After survey respondents had clicked the link to the survey, they saw a greeting message as well as the requirements to take part, which were being at least 18 and currently living in Sweden. The first section then elicited respondents' basic demographic facts such as, age, gender, income, level of education and city size. Section 2 elicited the respondents' prior beliefs concerning Sweden's emissions and social norms, further explained in 2.3.1. Section 2 also contained an attention screener question to test whether respondents were carefully reading the questions (Haaland et al., 2020). Due to Google forms lacking a built-in randomization function, the attention screener was also used to sort respondents into three groups by asking them to select a symbol[7]. The randomization resulted in groups that were somewhat numerically

Survey layout

1. Demographics
2. Prior beliefs
   - Group 1: Emissions treatment
   - Group 2: Norms treatment
   - Group 3: Control
3. Policy support
4. Social preferences
5. Posterior beliefs

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[5] A couple of measurements: climate change denial and government trust, were not used in the analysis will therefore omitted

[6] See Appendix for a print-out version of the full survey in Swedish

[7] See Appendix page 35

uneven, yet not significantly different in any of the main variables, as is shown in the balance table on page 13.

Respondents were then assigned to either the treatment groups (1 and 2) or the control group (3). The information treatments will be explained in 2.3.2. After seeing the provided information, the treatment groups were asked if they understood the information and on a 5-point likert scale state their level of trust in it (Haaland et al., 2020). Thereafter, in section 3, followed questions that elicited respondents' support for various climate policies, explained in 2.3.3. The policy questions followed directly after the treatments in order to minimize any effect other unrelated questions might have had on these answers.

In sections 4 and 5 respondents were asked questions relating to various social and economic preferences, such as altruism, universalism, and political preferences. These will be explained in 2.4. Questions in sections 4 and 5 were somewhat mixed to make the sections more even in length and to keep the respondent more engaged. The survey ended with asking respondents about their self-estimated "willingness to sacrifice more" for the climate, as well as their posterior beliefs about Sweden's emissions and social norms.

2.3 Main variables and information treatment

This section goes over the three most central components and measurements of the survey. These are: 1. The two main belief variables, relating to what the respondent believes about Sweden's emissions and social norms. 2. The information treatment and 3. The variables representing respondents' climate change mitigation efforts, namely (1) Policy support and (2) Willingness to sacrifice more for the climate.

2.3.1 Measuring beliefs about emissions and social norms

Analyzing the impact of certain beliefs on climate mitigation efforts was the main objective of the study, therefore clear measurements of these beliefs were a necessity. The two main beliefs, those targeted by the information treatment, relate to Sweden's emissions and social norms.

The beliefs were measured twice in the survey, in section 2 (Prior beliefs) and in section 5 (Posterior beliefs). Prior beliefs were elicited to allow for analyzing belief revisions and heterogeneity in treatment effects between respondents with differing prior beliefs. Posterior beliefs served as the main variable representing beliefs in the analysis, and how it was measured is explained below.

Emissions belief: The posterior emissions belief was measured by respondents answering the question: "Compared to the level of emissions needed to reach the goal of 1,5 °C - how much is Sweden currently emitting

per person and year?" There were 9 different alternatives ranging from "10 times less" to "about the same" to "10 times more".

Norms belief: Respondents' posterior beliefs about perceived social norms was measured by their answer to the question: "Out of 100 Swedes, how many want stricter government measures to fight climate change?". This belief thus captured the percentage of Swedish citizens that the respondent thinks would favor stricter government climate measures.

The questions eliciting posteriors were placed in section 5 of the survey to separate them as much as possible from the questions eliciting prior beliefs. The wording of the questions eliciting priors was slightly different[8] from the questions eliciting posteriors that are stated above. These measures were taken to minimize the risk of confusing respondents or causing consistency bias in their answers (Haaland et al., 2020).

2.3.2 Information treatments

Between section 2 and three, respondents were divided into three groups whereof two were given information treatments. The two treatments were attempts to affect respondents' potentially misinformed emissions and norms beliefs. The main reason for including two differing treatments was to allow for comparison of the effect between the newly introduced emissions treatment with a more commonly used type of intervention in information experiments, which is the norms treatment. This section will present the design of the information treatments.

The information treatments were framed in a simple and neutral way. The information was portrayed both in text and with a graph (Haaland et al., 2020). Both treatments were similarly worded and displayed to minimize the presentation resulting in a varying effect. The details of each treatment are explained below.

a. **Emissions treatment**

Respondents who received the emissions treatment saw the following text: "Research has shown that Sweden currently emits 9 tonnes greenhouse gasses per person and year. The 1,5 °C goal requires a world average of 1 tonne per person and year.". The source of the information was the Swedish environmental protection agency, Naturvårdsverket (2021b) which was displayed on the graph (see image *(a.)* below).
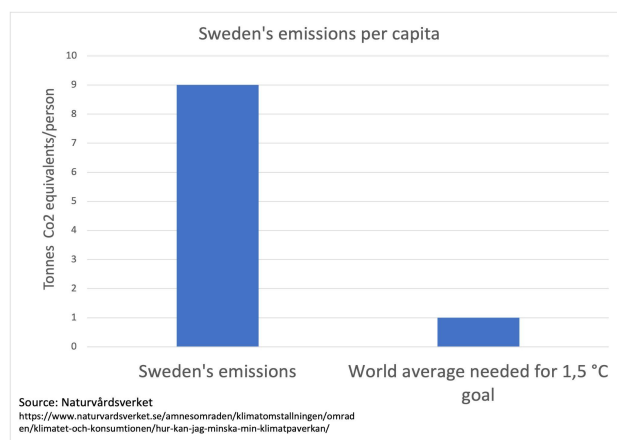
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[8] The question eliciting the prior norms belief differed by specifically mentioning government measures that "impose changes on people's behavior", which also was the exact wording of the information treatment.
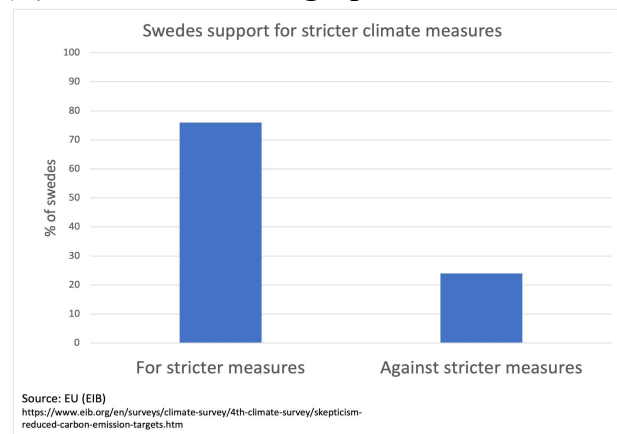
b. Norms treatment

Similarly, respondents who received the norms treatment saw the following text: "Research has shown that the percentage of Swedes in favor of stricter government measures, that impose changes on people's behavior, to fight climate change[9] is 76%.". The graphs accompanying the texts of each treatment can be seen below. The information was taken from a survey conducted by the European Investment bank (2021) and the source was displayed on the graph (see image *(b.)* below).

(a.) **Emissions treatment graph**

Sweden's emissions per capita

Source: Naturvårdsverket
https://www.naturvardsverket.se/amnesomraden/klimatomstallningen/omrad
en/klimatet-och-konsumtionen/hur-kan-jag-minska-min-klimatpaverkan/

(b.) **Norms treatment graph**

Swedes support for stricter climate measures

Source: EU (EIB)
https://www.eib.org/en/surveys/climate-survey/4th-climate-survey/skepticism-
reduced-carbon-emission-targets.htm

Survey treatments: Above are the graphs that were shown to each treatment group along with their respective text message. Note that the images were somewhat bigger in the actual survey (see Appendix pages 36 and 37).

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[9] In the actual survey, the term "Global warming" was used rather than "Climate change" for all questions due to simplicity. See Andre et al. (2021, 6)

c. Control group
Respondents in the control group received no information and proceeded to section 3 of the survey immediately after finishing section 2.

Having an identical source for both treatments would have been ideal, but no common source was found. The two pieces of information were therefore carefully selected based on having a credible source as well as for their simplicity and potential to challenge respondents' prior beliefs.

After seeing the information, respondents in the treatment groups were asked if they understood the information and had to state their degree of trust in it on a five-point likert scale (Haaland et al., 2020). Following the treatments, measurements of respondents' climate mitigation efforts were elicited.

2.3.3 Measuring climate change mitigation efforts in two ways

The two main dependent variables were measurements of climate mitigation efforts. These were (1) "Climate policy support", elicited in section 3 of the survey, and (2) "Willingness to sacrifice more for the climate". elicited in section 5 of the survey. Both measurements were taken after the treatment to enable measuring of the effect of the treatment on both these variables by comparing the three groups.

(1) **Climate policy support:** The main way climate change mitigation efforts were measured, was through respondents' support for various climate policies. Respondents were asked to state their support for seven different climate policies on a six-point likert scale. Their levels of support for the seven climate policies were summed, and the standardized sum made up the (1) "Policy support" variable. The individual policies that respondents had to evaluate were[10]:

1. Funding more research into renewable energy.
2. Provide tax rebates for people who purchase energy efficient vehicles and solar panels
3. Regulate Co2 emissions more strictly
4. Require that the electricity Sweden imports has not caused GHG emissions elsewhere even if it costs the average household an extra 1000kr/year
5. Increase taxes and fees on goods and services that cause high GHG-emissions in Sweden or abroad.
6. Increase the flight tax
7. Introduce a tax on meat.

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[10] Policies 1, 2, 3, 4 are similar to those utilized in an information experiment by Andre et al. (2021) on the US public. Policies 5, 6 and 7 were introduced to better fit the Swedish case.

(2) "Willingness to sacrifice more for the climate": A complementary measure of climate change mitigation efforts was the respondents' self-estimated willingness to sacrifice more to fight climate change. The respondents answered on a five-point likert scale how much they agreed with the statement "Me and others living in Sweden must make (further) personal sacrifices to fight climate change".

This measurement was introduced to capture any effects the treatment may have had, in a more general and less concrete sense, on respondents' climate change mitigation efforts. Respondents may want to fight climate change, yet not view any of the specific climate policies as an appropriate means to do so, in which case this variable will capture such attitudes.

2.4 Measuring other preferences

Other preferences that may impact respondents' climate change mitigation efforts were also elicited in section 4 and 5 of the survey. These will be explained in this section. The measurements were based on the variables found most significant in a study by Andre et al. (2021) in predicting willingness to fight climate change. The way the variables were measured was somewhat simplified to keep survey completion time around 5 minutes.

The only newly introduced variable is "individual denialism", meant to reflect the belief that one's individual efforts to fight climate change do not make any difference in the big picture. All preference and belief variables (except dummy variables) were standardized before the analysis to have a mean of 0 and standard deviation of 1.

Altruism was measured through a couple questions, one qualitative and one quantitative (Haaland et al., 2020). The qualitative measure was the respondents' level of agreement with the statement "I am willing to give to good causes without expecting anything in return" on a five-point likert scale. The qualitative measure asked the respondent how much they would donate to a good cause if they were to unexpectedly receive 10 000 kr today. To make up the altruism variable, the answer to the qualitative question was divided by 100 and summed with the response to the qualitative question.

Universalism was used as a measurement of how much the respondent identifies as part of their nation or as a part of the world, which is relevant in the case of a global problem like climate change. Similar to how the variable was measured in a study by Lind et al. (2018), the respondents answered on a five-point likert scale if they viewed themselves mainly as citizens of Sweden (1) or the world (5).

Individual denialism was used as a measurement of whether the respondent holds the belief that their own individual emissions do not make any difference for the issue of climate change. The viewpoint has even been philosophically defended (Sinnott-Armstrong, 2010)[11] and may therefore be a robust justifying belief for individuals to not fight climate change by individual action. The variable was measured by asking respondents how well, on a five-point likert scale, the following statement reflects their view: "My individual emissions do not make any significant difference in the big picture. I, as an individual, cannot affect climate change"

Political preferences were measured by asking respondents if they identified more as "Politically left", "Politically middle" or "Politically right". Asking for more specific party support was not done since it likely would have made more respondents unsure of their choice.

Basic demographic facts including age, level of education, gender, income, and city size were also elicited to be used as additional control variables and comparing the demographics between groups (see balance table on next page).

3. Results

This section will present the results of the analysis. Section 3.1 looks at what factors determine climate mitigation efforts while section 3.2 and onward presents the effects of the treatments.

The next page displays the balance table over the full sample as well as the treatment groups. The randomization in Google forms made the emissions treatment group somewhat bigger than the other two groups. The randomization was successful overall since the groups did not significantly differ in most characteristics or prior beliefs. The groups differed significantly only in the age and income variables. Both are controlled for in the main analyses. Nevertheless, it cannot be ascertained that the sample is an accurate representation of the Swedish public.

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[11]The name "individual denialism" comes from John Broome's (2019) criticism of the view.

Balance table

	Emissions treatment		Norms treatment		Control group			Full sample	
% Of total	44% (n=165)		27% (n=102)		29% (n=106)			100% (n=372)	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**P-value**	**Mean**	**SD**
Age	39.451	13.550	33.990	11.886	36.047	12.210	0.002	36.984	12.912
Income	33817.1	17198.3	28784.3	15392.9	31603.8	16908	0.057	31806.4	16723.5
City (100k+)	0.750	0.434	0.725	0.448	0.717	0.453	0.816	0.734	0.443
Female	0.695	0.462	0.755	0.432	0.698	0.461	0.539	0.712	0.453
Student	0.189	0.393	0.284	0.453	0.245	0.432	0.186	0.231	0.422
Uni. degree	0.646	0.480	0.647	0.480	0.613	0.489	0.834	0.637	0.481
Priors: Emissions	3.701	3.489	3.422	3.777	2.802	3.867	0.146	3.368	3.692
Priors: Norms	0.388	0.188	0.392	0.196	0.394	0.183	0.959	0.391	0.189
Politically left	0.415	0.494	0.461	0.501	0.330	0.474	0.147	0.403	0.491
Politically middle	0.311	0.464	0.294	0.458	0.311	0.466	0.951	0.306	0.462
Politically right	0.274	0.448	0.245	0.432	0.358	0.480	0.166	0.290	0.455

Above is the balance table over samples from the survey experiment. The p-value refers to comparing the three groups, emissions treatment, norms treatment and control group with an ANOVA test.

3.1 Determinants of Swedes' climate mitigation efforts

This section looks at the relationship between climate mitigation efforts and beliefs about Sweden's emissions, social norms, and other economic and social preferences. In other words, it will see into any correlational evidence of the link between climate mitigation efforts and various beliefs and factors. The causal effects of the treatments will be then analyzed in the following section (3.2).

To investigate what factors influence Swedes' climate change mitigation efforts, two regressions are run. The dependent variables, (1) "Policy support" and (2) "Willingness to sacrifice more" for the climate, are regressed on what the respondent believes about: Sweden's emissions in relation to the 1.5°C goal (posterior emissions belief), the percentage of Swedes in favor of stricter climate measures (posterior norms belief), as well as a range of other preferences and sociodemographic factors. To simplify the interpretation of the results, all measures of beliefs and preferences have been standardized to have a mean of zero and a standard deviation of 1. Detailed results are shown in Table 1 on the next page.

Beliefs about Sweden's emissions and social norms are found highly significant in predicting both (1) Policy support and (2) Willingness to sacrifice more for the climate. A standard deviation increase in the emissions belief increases (1) Policy support by 0.171 and (2) Willingness to sacrifice more by 0.184 (of a standard deviation). Since a standard deviation for the posterior emissions belief is approximately equal to 4 (4.12 tons of GHG per capita), the result can be interpreted as follows: if a respondent's emissions belief increases by 4, (1) Policy support increases by 0.171 and (2) Willingness to sacrifice more by 0.184.

Similar results are found for the norms belief, where a standard deviation increase corresponds to 0.178 increase in (1) Policy support and a 0.146 increase in (2) Willingness to sacrifice more. The posterior norms belief is measured by percentage points and has a standard deviation of approximately 20% (21.1%). This result can therefore be interpreted as: if a respondent's belief about the percentage of Swedes in favor of stricter climate measures increases by 20%, (1) Policy support increases by 0.178 and (2) Willingness to sacrifice more increases by 0.146.

These results indicate that both beliefs about how Sweden is doing in relation to the 1.5°C goal and about the percentage of Swedes in favor of stricter measures affect Swedes' climate change mitigation efforts, measured as policy support and self-estimated willingness to sacrifice more for the climate. The effect of the norms belief on (1) and (2) indicates that Swedes' climate mitigation efforts depend therefore partly on social expectations, since they are conditional on what an individual believes others are in favor of.

TABLE 1	**(1) Policy support**	**(2) Willingness to sacrifice more**
Beliefs		
Emissions belief	0.171*** (0.047)	0.184*** (0.049)
Norms belief	0.178*** (0.045)	0.146*** (0.044)
Economic and social pref.		
Altruism	0.129** (0.055)	0.119** (0.056)
Universalism	0.107** (0.049)	0.126** (0.056)
Individual denialism	-0.215*** (0.047)	-0.358*** (0.050)
Sociodemographics		
Age	-0.003 (0.004)	-0.000 (0.004)
Log income	-0.112 (0.154)	0.109 (0.154)
Female	0.097 (0.109)	0.111 (0.111)
Student	0.071 (0.201)	0.193 (0.209)
Politically left	0.325*** (0.098)	0.113 (0.103)
Politically right	-0.325*** (0.114)	-0.301** (.123)
University degree	0.126 (0.095)	0.052 (0.101)
City (>100k inhabitants)	-0.013 (0.112)	-0.118 (0.107)
Constant	1.09 (1.531)	-1.11 (1.538)
R² (adjusted)	0.341	0.323
N	372	372

Above are OLS estimates based on 372 survey responses. The dependent variables are (1) Policy support and (2) Willingness to sacrifice more to fight climate change. All variables, except the binary dummy variables, are standardized to have a mean of 0 and standard deviation of 1. The dummy variables are "Female", "Student", "Politically left", "Politically right", "University degree" and "City". The constant represents the intercept for respondents who are male, non-student, politically middle, hold no university degree and do not live in a city
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parentheses.

Moreover, other factors are also shown to have an effect on (1) Policy support and (2) Willingness to sacrifice more. Both "Altruism" and "Universalism" have a positive impact on both dependent variables. Unsurprisingly, individual denialism toward climate change is found to have a highly significant negative impact on both (1) and (2). The negative effect is larger in the case of (2) Willingness to sacrifice more, which seems reasonable since (2) clearly relates to individual efforts as opposed to climate policies which are instances of societal effort.

Political preferences are also found significant, especially among respondents who identify as politically right. People who identify as politically right are less likely to favor stricter climate policies as well as less likely to be willing to sacrifice more for the climate. People who identify as politically left show higher levels of support for stricter climate policies. This is unsurprising since most of the policies involve higher taxes or more governmental influence over people's choices. Identifying as politically left showed no statistically significant effect on (2) Willingness to sacrifice more.

The age, income, student, and gender variables were found insignificant. This was also the case for the city variable. The vast majority (+70%) of respondents lived in a city, defined as having 100k+ inhabitants.

In sum, a wide variety of factors influence Swedes' climate mitigation efforts, measured as (1) Policy support and (2) Willingness to sacrifice more for the climate. Both the emissions and norms beliefs are found to have a significant positive effect. A range of normative beliefs are also shown to have an impact. These include political preferences, but also economic and moral beliefs such as altruism, universalism and individual denialism.

3.2 Correcting misinformed beliefs

The two treatments were attempts to exogenously vary respondents' beliefs about either Sweden's emissions or prevalent social norms. This section investigates how the various treatments affected respondents' beliefs and how it impacted their (1) Policy support and (2) Willingness to sacrifice more for the climate.

The effect of the treatment will to some extent depend on respondents' prior beliefs. The averages of the prior beliefs were significantly different from the actual share both for the emissions and norms belief. This indicates that the respondents are to some extent misinformed about Sweden's emissions and the number of Swedes in favor of stricter measures. Below is the distribution of prior beliefs shown in relation to the actual amount.

Panel A: Emissions belief priors   **Panel B:** Norms belief priors

Average belief   ····· Actual share
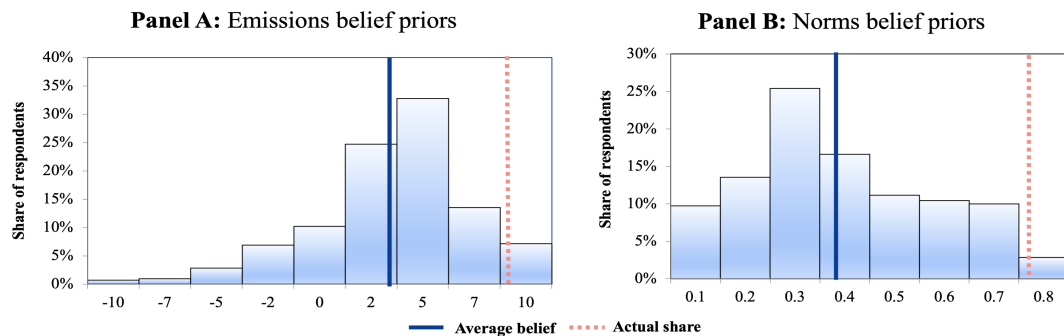
Prior beliefs: Above are how respondents' prior beliefs were distributed, the average prior belief (blue line) as well as the actual share (dotted red line). Panel A's horizontal axis shows the possible answers to the question eliciting prior emissions beliefs. For instance, the answer "-10" corresponds to the belief that Sweden's current emissions are 10 times less than what the 1.5°C goal requires, "0" that they are about the same, "5" five times more etc. Panel B's horizontal axis shows the possible answers to the question eliciting prior norms beliefs, namely percentages. For instance, the answer 0.3 corresponds to believing that 30% of Swedes are in favor of stricter climate measures. Average beliefs differ significantly different from actual share, ***$p < 0.001$ in both cases.

3.2.1 Treatment effects

Section 3.1 demonstrated that respondents' emissions and norms beliefs positively predict climate change mitigation efforts. Panel A and B in section 3.2, show that respondents both underestimate Sweden's emissions and the percentage of Swedes in favor of stricter climate measures. This section will look specifically at how the information treatments, aiming to correct these misperceived beliefs, affected respondents' climate change mitigation efforts. Control variables are included in the analysis (as stated under each table), but their coefficients will not be displayed since they were analyzed in the previous section. This section is mainly concerned with the effects the two information treatments had on respondents' climate change mitigation efforts.

To investigate the effect of the information treatment, four regressions are run. The main dependent variables (1) Policy support and (2) Willingness to sacrifice more, are regressed on the treatment dummies and a number of control variables. The results can be seen in Graphs 1 and 2 on the next page. To study whether respondents revised their beliefs after receiving the treatments, the variables: (3) Posterior emissions belief and (4) Posterior norms belief are also regressed on the same variables. Details of all four regressions can be found in Table 2, below graphs on the next page.
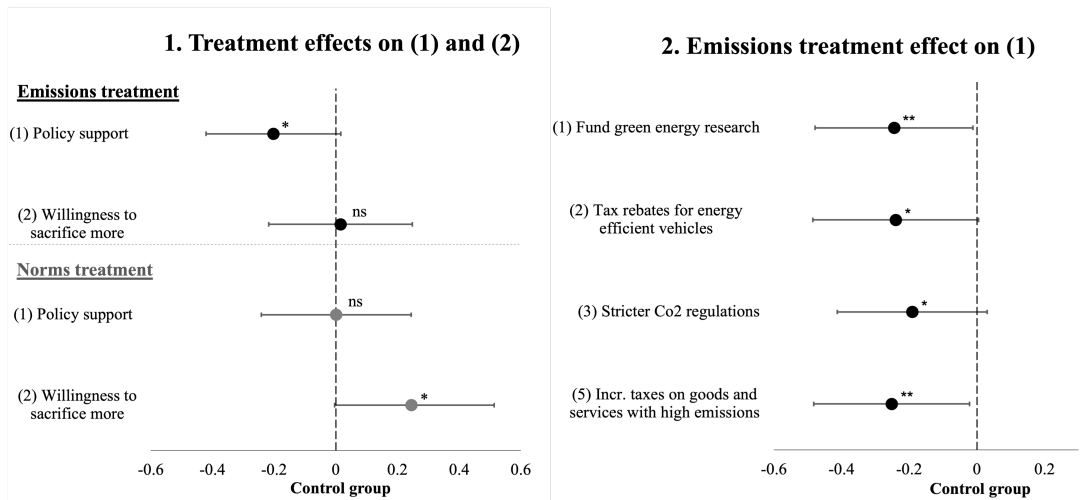
Graph 1 (Left). This graph shows the effects of the treatments with 95% confidence intervals. Emissions treatment (upper half) showed a significant negative effect on dep. variable (1) Policy support. Norms treatment (Lower half) showed a significant positive effect on dep. variable (2) Willingness to sacrifice more. Detailed results are displayed in Table 2. Controls are stated below Table 2.

Graph 2 (Right). This graph shows the significant effect of the emissions treatment on 4 out of the 7 policies that make up the (1) Policy support variable with 95% confidence intervals. Same controls as in Table 2 are included. Treatment did not show any significant effect on the remaining policies.

TABLE 2 – Treatment effects.	(1) Policy support	(2) Willingness to sacrifice more	(3) Posterior emissions belief	(4) Posterior norms belief
Emissions treatment	-0.203* (1.07)	0.015 (0.121)	0.980*** (0.107)	-0.073 (0.106)
Norms treatment	0.001 (0.120)	0.245* (0.130)	0.061 (0.121)	1.073*** (0.122)
N	372	372	372	372

Above are OLS estimates for the different treatment groups. The dependent variables are (1) Policy support, (2) Willingness to sacrifice more to fight climate change, (3) Posterior emissions belief and (4) Posterior norms belief. The dependent variables have been standardized to have a mean of 0 and standard deviation of 1. Treatment variables are binary dummy variables.
Controls are "Female" "Age" "Log income" "Politically left", "Politically right" and "City"
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parentheses.

Both treatments showed some effect on the main dependent variables (1) and (2), albeit in contrasting ways. The group receiving the emissions treatment lowered their policy support by 0.203 of a standard deviation compared to the control group. The result was similar (-0.202) without controls, but with a higher degree of

significance (**p<0.01)[12]. The negative effect of the emissions treatment on respondents' policy support is surprising, since the emissions belief was found to positively predict climate mitigation efforts (in 3.1). This result will be analyzed further in the next section (3.2.2) and in the discussion. Graph 2 on the preceding page shows the significant effect of the emissions treatment on specific policies. The negative effect of the emissions treatment is significant in four out of the seven climate policies, displayed in Graph 2.

The norms treatment did not show any significant difference from the control group in regard to (1), Policy support. In regard to (2) Willingness to sacrifice more however, the norms treatment had a positive effect. In determining (2), the intercept of the group receiving the norms treatment was 0.245 of a standard deviation above the control group.

Respondents' beliefs about both Sweden's emissions in relation to the 1.5°C goal (emissions belief) and the percentage of other Swedes in favor of stricter measures (norms belief) were, as described in the method section of this paper, elicited both before and after the information treatment. It is thereby possible to measure the extent to which the treatments revised respondents' beliefs in the various groups. The results can be seen in the last two columns of Table 2 on the preceding page, where the posterior beliefs about (3) emissions and (4) norms are the dependent variables. The results show that the treatments successfully revise respondents' beliefs for each treatment group by about a standard deviation. The results can be interpreted as: group receiving the emissions treatment responded, on average, that Swedes emit approximately 4 tons of GHG more than the other groups when their posterior beliefs were elicited. For the posterior norms belief, the norms treatment group responded on average with a percentage that was about 22% above the other groups. There are no significant spill-over effects between the groups, meaning that the emissions treatment didn't affect the posterior norms beliefs or vice versa. Both treatments thus, successfully revised beliefs upward, closer to what the information in each treatment indicated.

3.2.2 Mediation analysis
In Table 1 respondents' posterior beliefs about both Sweden's emissions were shown to positively predict (1) Policy support. However, those in the emissions treatment group showed significantly lower policy support than the control group, despite having their beliefs revised upward. This may depend on the emissions treatment having a direct negative effect on (1) Policy support, separable from the effect of respondents' posterior beliefs.
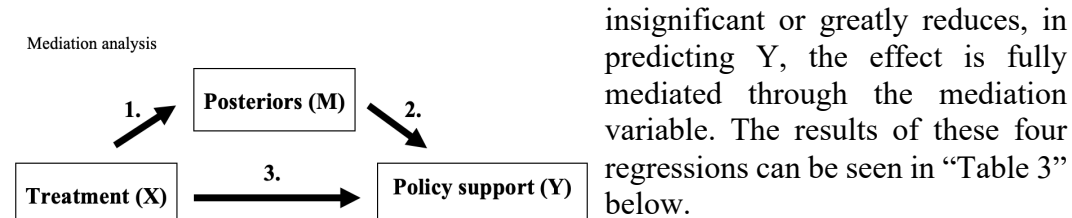
The analysis thus far has assumed that posterior beliefs would mediate the effect of the treatment on the dependent variables. In other words, that the treatment

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[12] This result without controls is not shown in any table or graph

(Independent variable, X) affected respondents' posterior belief (mediator variable, M), which in turn affects the dependent variable (Y) and that the treatment itself has no direct significant effect on the dependent variables. Mediation analysis is used to analyze the extent to which the effect of X is mediated via the mediator variable and would in the present case show if X had a direct significant effect on Y, independent from the effect of respondents' posterior beliefs.

A common way of conducting mediation analysis involves a few steps (Baron & Kenny, 1986, Croson et al., 2009). Relationships 1, 2 and 3 (shown in the figure to the left) are tested for significance. The fourth and final step involves predicting (Y) while including both X and M in the regression. If X then becomes insignificant or greatly reduces, in predicting Y, the effect is fully mediated through the mediation variable. The results of these four regressions can be seen in "Table 3" below.

Mediation analysis

TABLE 3 - Mediation analysis	1. Posteriors emissions (M)	2. Policy support (Y)	3. Policy support (Y)	4. Policy support (Y)
Emissions treatment (X)	0.938*** (0.109)		-0.229** (0.113)	-0.458*** (0.124)
Posteriors emissions (M)		0.138** (0.056)		0.244*** (0.062)
N	270	270	270	270

Above are 4 OLS estimates for the mediation analysis. Included data is from the emissions treatment group and control group. The dependent variable is respondents' posterior emissions belief in regression 1 and policy support in regressions 2-4. The variables have been standardized to have a mean of 0 and standard deviation of 1. Emissions treatment variable is a binary dummy variable. Controls are "Politically left" and "Politically right".
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parentheses.

The results of the mediation analysis shows that all variables are found to be highly significant in all regressions, including regression 4, where both the independent and mediator variables predict policy support (Y). This indicates that the posterior beliefs variable (M) does not mediate the effect of the treatment (X) on Policy support (Y). Rather, the emissions treatment is shown to have a direct effect on the dependent variable, which is negative, contrary to the impact of the mediation variable. This indicates that the emissions treatment had a direct, negative effect, on the dependent variable separable from the effect of respondents' beliefs about Sweden's emissions.

3.2.3 Effects in subgroups

Four subgroups are separately analyzed to explore whether the treatment effects varied among respondents. The first comparison, in Table 4, is between two groups with varying prior beliefs in the treatment information. In "High prior beliefs" (column 2 and 3) respondents who had prior beliefs roughly below the mean in a treatment group, were eliminated from the analysis. In other words, respondents who had a prior emissions belief of 2 tonnes GHG per capita or less were eliminated from the emissions treatment group. Similarly, respondents who had a prior norms belief of less than 50% were eliminated from the norms treatment group. The "Low prior beliefs" (column 4 and 5) group is made by inverting the sorting procedure. The results can be seen in Table 4.

The second comparison looks at varying effects between groups with different degrees of trust in the treatment information. Groups are similarly sorted. In "High trust in treatment", respondents who received a treatment but answered that their trust in the treatment information was <4 on the five-point likert scale were eliminated. The "Low trust in treatment" group is again made by inverting the procedure. Results are shown in table 5.

TABLE 4	High Prior Beliefs		Low Prior Beliefs	
	(1) Policy support	(2) Willingness to sacrifice more	(1) Policy support	(2) Willingness to sacrifice more
Emissions treatment	-0.132 (0.123)	-0.067 (0.139)	-0.296** (0.135)	0.06 (0.145)
Norms treatment	-0.080 (0.167)	0.133 (0.188)	0.037 (0.138)	0.317** (0.148)
N	236	236	244	244

TABLE 5	High trust in treat.		Low trust in treat.	
	(1) Policy support	(2) Willingness to sacrifice more	(1) Policy support	(2) Willingness to sacrifice more
Emissions treatment	0.165 (0.112)	0.250* (0.133)	-0.591*** (0.140)	-0.232 (0.150)
Norms treatment	0.202 (0.140)	0.281* (0.166)	-0.112 (0.151)	0.259 (0.131)
N	239	239	239	239

Above, in table 4 and 5 on the preceding page, are the OLS estimates for 4 different subgroups.

Table 4 – In "High priors" respondents who received a treatment with priors <50% in the norms treatment group and <5 tonnes GHG-emissions in the emissions treatment group have been removed. "Low priors" is made by the inverse procedure.

Table 5 - In "High trust in treatment" respondents who stated that they trusted the information provided with <4 on a 5-point likert scale representing trust have been removed. "Low trust in treat." is made by inverting the procedure.

The dependent variables have been standardized to have a mean of 0 and standard deviation of 1. Treatment variables are binary dummy variables.

Controls are "Female" "Age" "Log income" "Politically left", "Politically right" and "City"

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parentheses.

The subgroup analysis indicates some heterogeneity in how the treatment affected respondents. Comparing the two groups that differ in prior beliefs, seen in Table 4, the group driving the effect of both treatments is the group with low prior beliefs. Compared to the full sample, the treatment effects are enhanced in the group with low priors and insignificant in the group with high prior beliefs. This aligns with the treatment having a stronger impact when it more drastically challenges the respondents previously held beliefs. No new significant effects could be discerned in any subgroup with varying prior beliefs.

A higher degree of heterogeneity is found when the two subgroups, based on respondents' level of trust in the treatment information, are compared. Those with low trust in the emissions treatment show a large and highly significant negative effect, of almost 0.6 of a standard deviation, on (1) Policy support. In stark contrast, respondents with high trust in the treatment show a positive, yet insignificant, effect on the same variable. For those with high trust in the emissions treatment information, the treatment even had a significant positive effect of 0.250 on (2) Willingness to sacrifice more. This was the only positive significant effect found on (1) or (2) caused by emissions treatment in any of the analyses conducted.

The high degree of heterogeneity in the effects of the emissions treatment, found by looking at varying levels of trust among respondents, may indicate that some respondents found the emissions treatment information hard to believe or that it lacked credibility. However, people in the low trust group still revised their posterior beliefs after receiving the treatment with an effect similar to the full sample[13]. This may point to some other factor also driving the effect, as was indicated by the mediation analysis, even for the group with low trust.

Looking at the effects of the norms treatment for subgroups with varying degrees of trust, the positive effect remained in both groups, but the variable just barely became insignificant (p=0.1099) in the group with low trust. This suggests

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[13] Emissions treatment effect on emissions posteriors were 0.960*** in the low trust group. Norms treatment effect on norms posteriors were 0.864*** in the same group. This is similar to the effects of the full sample in Table 2. These results are not shown in any table.

that the norms information may have an impact even if it drastically challenges respondents' prior beliefs or does not seem fully credible. At the very least, it does not trigger negative effects, even for respondents with low trust in the norms information, as was the case with the emissions treatment.

4. Discussion

4.1 Results

Understanding what mere information can achieve is important in the fight against climate change. This study set out to investigate: (1) what beliefs motivate Swedes' climate change mitigation efforts, (2) whether their beliefs, about Sweden's emissions and the percentage in favor of stricter climate measures, are aligned with reality and (3) how corrective information affects climate mitigation efforts.

By analyzing data gathered in an online experiment, this study finds that people living in Sweden underestimate Sweden's actual climate efforts in relation to the 1.5°C goal. They also underestimate the percentage of Swedes who state that they are in favor of stricter climate measures. The study also demonstrates how holding such beliefs, as well as other economic and social preferences, influences climate policy support and willingness to do more for the climate.

Effects of the information treatments on subjects' climate mitigation efforts were documented. Relating the results to the main research question, the answer is that the two types of information can affect climate mitigation efforts, but that the effects on (1) Policy support are negative or limited. Providing subjects with information about Sweden's emissions lowered policy support for the full treatment group, lowered it even more in the treatment group with low priors and significantly more in the group with low trust in the information. The emissions treatment effect on (1) Policy support for those with low trust in the information was highly negative. For those with high trust, the emissions treatment had a positive yet insignificant effect. This points to the respondents' trust in the emissions information provided matters, but it is unclear precisely to what extent. This is so because trust also is measured by whether respondents choose to revise their beliefs, which the low trust group also did[14]. It therefore seems unlikely that a message perceived as more credible would have drastically changed the total effect of the emissions treatment. Even for the group with high trust in the emissions treatment, no significant positive effect was documented on respondents' policy support. Thus, the results provide evidence that the overall effect of the emissions treatment is insignificant or even negative to respondents' climate change mitigation efforts.

Out of the two treatments, the norms treatment shows the most potential for increasing climate mitigation efforts. Providing subjects with information about

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[14] See footnote 13

social norms is shown to have a positive impact on climate mitigation efforts of the full sample, when measured as self-estimated willingness to sacrifice more for the climate. The effect is even quite similar for the group with low trust in the treatment information, although just barely insignificant. No effect can be seen on policy support for any group who received the norms information, meaning that no treatment showed any significant positive effect on respondents' policy support. A potential explanation for this, in case of the norms treatment, could be that the information lacked enough specificity for it to impact respondents' view of any concrete policies. The treatment only mentioned the percentage of other Swedes in favor of "stricter measures". It could be that the respondents did not, from this fact alone, infer the that any of the specific policies mentioned would be socially approved (Bicchieri & Dimant, 2019). The lacking effect could also depend on how the public as a whole relates to climate change. For instance, Andre et al. (2021), found a positive effect on specific climate policies with a similar "unspecific" norms intervention on the US population. But also, that the effect was mostly driven by those who were climate change deniers, a subgroup which is very small in Sweden (Naturvårdsverket, 2021a).

4.2 Limitations

The study has several limitations. Some points are worth making regarding the negative effect of the emissions treatment on respondents' policy support. The direct negative effect of the treatment was shown in the mediation analysis in the results section. This result may be the most important for this study, since it shows how information interventions sometimes can backfire. However, the direct effect of the treatment makes it more difficult to interpret precisely in what way respondents were affected by it. Since respondents receiving the emissions treatment lowered their policy support, despite revising their beliefs, a range of external, so far unconsidered, factors could be driving the direct negative effect. For instance, considering that the respondents' prior beliefs differed substantially from the actual amount, the treatment may have caused a sense of resignation in the respondents which lowered their policy support. Or perhaps being confronted with information that strongly contradicts prior beliefs about Sweden being a country at the forefront of fighting climate change could even come across as provocative for some. This may have led respondents to adhere even more strongly to some related prior belief, such as that Sweden still need not take further climate action. Such an explanation aligns quite well with the theory of motivated reasoning, which states that people seek information that confirms their previously held beliefs and ignores information that comes into conflict with it (Diamond et al., 2020). Since the emissions treatment does not explicitly challenge the belief that Sweden does not

need to take further action, respondents may have held on to this belief even more strongly after receiving the emissions treatment.

Another possible explanation for the direct negative effect of the emissions treatment could depend on respondents perceiving what the government currently is doing as a metric for what further climate measures are in fact necessary. When the information treatment reveals that Sweden is farther from the 1.5°C goal than what respondents' first thought, they may think that things are as they should, simply due to the fact that more governmental measures aren't actively being taken. The fact that the government is not doing more to lower Sweden's seemingly high emissions may suggest that nothing new needs to be done. A similar, and perhaps related, way of explaining the negative effect would be attributing it to what is known as status quo bias, i.e., that people are overly reluctant to move away from the status quo. For instance, support for certain climate policies have been shown to vary greatly depending on whether or not people believe they have already been implemented (Lang et al., 2021). Even though it is not possible to precisely determine what lies behind the direct negative effect, the results do provide evidence that information interventions can produce undesirable outcomes.

Furthermore, there is some risk of experimenter demand effects in the survey responses. For instance, there is a possibility that respondents did not actually update their beliefs after receiving the treatment all the while stating that their posterior beliefs had been updated. This could be a result of respondents' just wanting to align their responses with what the survey suggested was correct, rather than an actual belief update. Another possible explanation for the direct effect discussed in the previous paragraphs could be a "reverse" experimenter demand effect. Respondents' policy support was elicited right after they received the treatment. This may have seemed suggestive that they are "supposed" to show high levels of support and therefore instead triggered an opposite response. Some measures were taken to reduce experimenter demand however, such as anonymity and neutrally formed information treatments (Haaland et al., 2020). More measures could have been taken, such as having a follow up survey, or more irrelevant questions, but would have come at the expense of higher attrition rates and lower participation (Haaland et al., 2020). Nevertheless, there is evidence that experimenter demand effects are limited in most cases (de Quidt et al., 2018; Mummolo & Peterson, 2019).

A final limitation worth addressing is that the main variables do not capture the full scope of potential climate mitigation efforts among respondents. The main dependent variable, (1) "Policy support", has the disadvantage that, even if political preferences are controlled for, the respondent might not necessarily agree that the specific policies are appropriate ways to mitigate climate change. Another remaining problem is that the everyday implications of these specific policies would undoubtedly still vary for respondents', even though the policies chosen

were quite broad for this reason. The policy support variable is thereby a somewhat limited way of capturing willingness to make concrete sacrifices for the climate, even though the policies likely would have implied some sacrifices for most respondents' everyday lives.

As mentioned in the method section, the two main dependent variables were meant to complement each other in order to mitigate these issues. A disadvantage with the dependent variable (2) Willingness to sacrifice more, corresponds to the advantage of (1), in that respondents may think that they are willing to make further sacrifices, yet would not be willing to support any measures that would involve actual sacrifices for their everyday lives. The main remaining problem of using the two dependent variables is thereby their inability to measure if respondents would have been willing to make further specific sacrifices that did not correspond to the sacrifices implied by the policies that made up the (1) Policy support variable.

5. Conclusion

This paper has analyzed the role of certain beliefs for Swedes' climate change mitigation efforts. Based on survey results from 372 people living in Sweden, this study finds that beliefs about Sweden's emissions in relation to the 1.5°C goal and the percentage of Swedes in favor of stricter climate measures positively predict respondents' climate mitigation efforts. A wide range of other beliefs such as altruism, universalism and individual denialism are also shown to predict Swedes' climate mitigation efforts. Furthermore, the study also finds that Swedes greatly underestimate Sweden's emissions as well as the percentage of Swedes in favor of stricter climate measures.

Most importantly, this study also provides evidence that information provision can impact climate mitigation efforts, but that the effect may be limited or even negative. Information about Sweden's emission is shown to have an overall negative impact on respondents' policy support. The negative effect is not mediated by respondents' posterior beliefs which are significantly revised by the treatments. The emissions treatment thus showed a direct negative effect on respondents' policy support. Information about the percentage of other Swedes in favor of stricter climate measures is shown to have a positive impact only on subjects' self-estimated willingness to sacrifice more for the climate. Some questions remain unanswered, such as what precisely caused the direct negative effect of the emissions treatment. It is also not documented to what degree respondents' beliefs were actually changed and if they will sustain over time.

Clarifying the potential impact of information and how it may vary across populations with varying demographics and beliefs will be investigated in future research on the role of information in the fight against climate change. Continued research on the subject may be advised to put more emphasis on the role of social

information interventions, since their impact likely is less country specific. Complimentary research on alternative measures may also be advised since some information interventions may have limited effects or could potentially even harm public support for further climate measures.

The results of this study have implications for the continued implementation of societal measures against climate change and policy design. The use of information interventions as a way of increasing climate mitigation efforts may have a limited effect, especially as a means of increasing climate policy support. When utilized, the information provided should be chosen with care and its impact should be thoroughly understood beforehand due to the risk of it being detrimental to citizens' climate mitigation efforts. Interventions relying on social information may prove to be a "safer" option compared to untested interventions addressing certain descriptive beliefs. However, the efficiency of social norm interventions may differ between populations[15], so an effect is not guaranteed. Information interventions may be one way to increase climate mitigation efforts. But their efficiency when utilized on a given population or cohort ought to be understood beforehand to be adequately weighed against alternative measures. Ethical considerations are also necessary before implementing information interventions on a large scale.

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[15] Indicated by the norm-treatments insignificant effect on policy support in this study to the positive effect found by Andre et al. (2021) on the US population.

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Appendix

The appendix includes a printout version of the survey. Note that the survey was only done online and therefore had a slightly different appearance. The texts next to some answers (i.e., "skip to question X") such as on the attention screener question (11), could not be seen in the online format. The questions were also not numbered in the online format.

Furthermore, the questions that state "Mark only one oval" were drop down menus in the online format. Also note that only one (or none) of the treatments were shown to each respondent, in this sketch treatments are shown right after one another.

Enkät

Den här enkäten är helt anonym och tar cirka 5 minuter att gå igenom. Resultaten kommer att utgöra underlag för en uppsats.

För att medverka måste du vara minst 18 och bo i Sverige. Vänligen svara ärligt och använd inte google.

Ditt deltagande uppskattas verkligen.

(For english, use this link: https://docs.google.com/forms/d/e/1FAIpQLSfGMCbO0La-m896M2RP4HWQHJyBM3y8gu2pCAFSnHLBxYCHcg/viewform?usp=sf_link)

* Required

Sida 1/5

1. Hur gammal är du? *

    _____

2. Du är.. *

    Mark only one oval.

    ⬭ Kvinna

    ⬭ Man

    ⬭ Other: _____

3. Vad är din utbildningsnivå? *

   Mark only one oval.

   ◯ Gått ut högstadiet eller mindre

   ◯ Gått ut gymnasiet

   ◯ 2 år på universitet eller mindre

   ◯ 3 år på universitet

   ◯ 4 år på universitet

   ◯ 5 år på universitet eller mer

4. Du bor i... *

   Mark only one oval.

   ◯ Mindre stad (0-20 000 invånare)

   ◯ Mellanstor stad (20k-100k invånare)

   ◯ Större stad (100k+ invånare)

5. Din månadsinkomst (före skatt) *

Mark only one oval.

◯ <20K

◯ 20-25k

◯ 25-30k

◯ 30-35k

◯ 35-40k

◯ 40-45k

◯ 45-50k

◯ 50-55k

◯ 55-60K

◯ 60k+

◯ Vill ej uppge

◯ Studentlån/CSN

Sida 2/5. Ämnet för en del av frågorna kommer att vara global uppvärmning

6. Vad tror du ligger bakom den globala uppvärmningen? *

Mark only one oval.

◯ Mänsklig aktivitet

◯ Naturliga orsaker

7. Generellt sett, hur mycket litar du på vetenskapsmän som säger att den globala uppvärmningen är ett hot? *

Mark only one oval.

	1	2	3	4	5	
Inte alls	◯	◯	◯	◯	◯	Mycket

8. Generellt sett, hur mycket litar du på den svenska staten? *

Mark only one oval.

	1	2	3	4	5	
Inte alls	◯	◯	◯	◯	◯	Mycket

9. Det finns en internationell överenskommelse att begränsa den globala uppvärmningen till 1,5 °C. Jämfört med utsläppsnivån som krävs för 1,5°C-målet, vad är Sveriges nuvarande utsläppsnivå tror du (per person och år)? *

Mark only one oval.

◯ 10 gånger mindre

◯ 7 gånger mindre

◯ 5 gånger mindre

◯ 2 gånger mindre

◯ Ungefär samma som 1,5°C-målet

◯ 2 gånger mer

◯ 5 gånger mer

◯ 7 gånger mer

◯ 10 gånger mer

10. Hur stor andel av svenskar tror du stödjer striktare statliga åtgärder som innebär begränsningar på människors beteende, för att motverka den globala uppvärmningen? *

Mark only one oval.

◯ 10%
◯ 20%
◯ 30%
◯ 40%
◯ 50%
◯ 60%
◯ 70%
◯ 80%
◯ 90%
◯ 100%

11. Den här frågan handlar om följande problem. I undersökningar som denna läser inte alla frågorna noggrant, vilket påverkar resultaten. Bekräfta att du läser noggrant genom att välja en symbol (ej nummer eller siffra) nedtill. *

Mark only one oval.

◯ 1   *Skip to question 15*
◯ #,   *Skip to question 15*
◯ 5   *Skip to question 15*
◯ #.   *Skip to question 13*
◯ #'   *Skip to question 17*
◯ 10   *Skip to question 13*
◯ 20   *Skip to question 13*
◯ 50   *Skip to question 17*
◯ 100   *Skip to question 17*
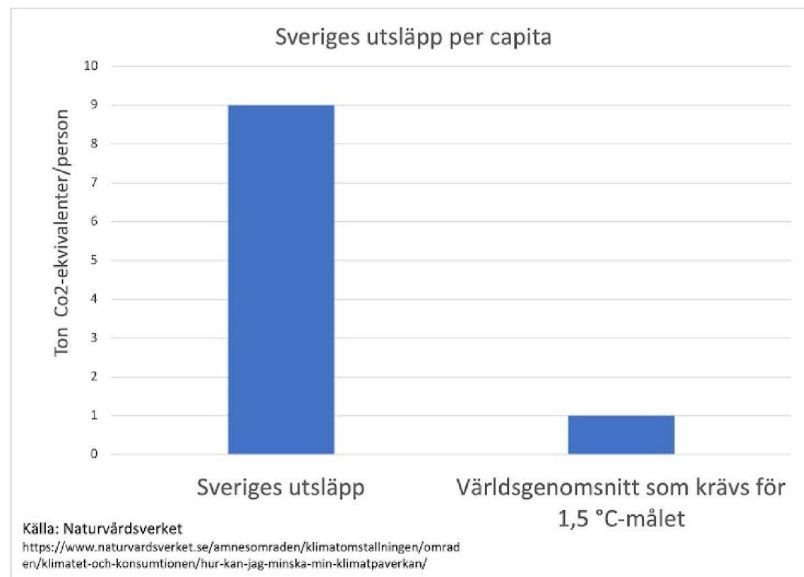◯ Vet ej.   *Skip to question 17*

Note: On question 11 (attention screener/group sorting question), the text "Skip to question X" could not be seen in the online format. The order of the alternatives was also randomized for each respondent

12. Bryr du dig om den globala uppvärmningen? *

Mark only one oval.

	1	2	3	4	5	
Inte alls	◯	◯	◯	◯	◯	Mycket

13. Forskning har visat att Sveriges nuvarande utsläpp är 9 ton växthusgaser per person och år. Målet på 1,5 °C kräver ett världsgenomsnitt på 1 ton per person och år. Vänligen svara ja om du har förstått. *

Källa: Naturvårdsverket
https://www.naturvardsverket.se/amnesomraden/klimatomstallningen/omrad
en/klimatet-och-konsumtionen/hur-kan-jag-minska-min-klimatpaverkan/

Mark only one oval.

◯ Ja

◯ Nej

◯ Vet ej

Note: There was a page break between question 12 and 13. Question 13 and 14 were only seen by those who received the emissions treatment.

14. Ser du den här informationen som pålitlig? *

Mark only one oval.

	1	2	3	4	5	
Inte alls	◯	◯	◯	◯	◯	Mycket

Skip to question 17

15. Forskning har visat att andelen svenskar som stödjer striktare statliga åtgärder som innebär begränsningar på människors beteende för att motverka den globala uppvärmningen är 76%. Vänligen svara ja om du har förstått. *

Svenskars stöd för striktare klimatåtgärder

Källa: EU (EIB)
https://www.eib.org/en/surveys/climate-survey/4th-climate-survey/skepticism-reduced-carbon-emission-targets.htm

Mark only one oval.

◯ Ja

◯ Nej

◯ Vet ej

Note: Question 15 and 16 were only seen by those who received the norms treatment.

16. Ser du den här informationen som pålitlig? *

Mark only one oval.

	1	2	3	4	5	
Inte alls	◯	◯	◯	◯	◯	Mycket

Skip to question 17

Sida 3/5. Vad anser du om dessa policies för Sverige?

17. Sverige bör: Ge mer bidrag till forskning på förnybara energikällor såsom vind och solkraft... *

Mark only one oval.

◯ Håller verkligen med

◯ Håller med

◯ Håller med till viss del

◯ Håller inte med till viss del

◯ Håller inte med

◯ Håller verkligen inte med

18. ...Ge skatteavdrag till de som köper energieffektiva fordon eller solpaneler.. *

Mark only one oval.

◯ Håller verkligen med

◯ Håller med

◯ Håller med till viss del

◯ Håller inte med till viss del

◯ Håller inte med

◯ Håller verkligen inte med

19. ...Reglera koldioxidutsläpp mer strikt... *

Mark only one oval.

- ( ) Håller verkligen med
- ( ) Håller med
- ( ) Håller med till viss del
- ( ) Håller inte med till viss del
- ( ) Håller inte med
- ( ) Håller verkligen inte med

20. ...Se till att elektriciteten Sverige importerar inte har orsakat några utsläpp av växthusgaser och att en större del av Sveriges elektricitet kommer från förnybara källor, även om det kostar ett genomsnittligt hushåll 1000kr extra/år... *

Mark only one oval.

- ( ) Håller verkligen med
- ( ) Håller med
- ( ) Håller med till viss del
- ( ) Håller inte med till viss del
- ( ) Håller inte med
- ( ) Håller verkligen inte med

21. ...Höja skatter och avgifter på varor och tjänster som orsakar betydande utsläpp av
     växthusgaser i Sverige eller utomlands... *

Mark only one oval.

◯ Håller verkligen med

◯ Håller med

◯ Håller med till viss del

◯ Håller inte med till viss del

◯ Håller inte med

◯ Håller verkligen inte med

22. ...Höja flygskatten... *

Mark only one oval.

◯ Håller verkligen med

◯ Håller med

◯ Håller med till viss del

◯ Håller inte med till viss del

◯ Håller inte med

◯ Håller verkligen inte med

23. ...Införa köttskatt *

Mark only one oval.

◯ Håller verkligen med

◯ Håller med

◯ Håller med till viss del

◯ Håller inte med till viss del

◯ Håller inte med

◯ Håller verkligen inte med

Sida 4/5

24. Hur väl överrensstämmer påståendet med dig : "Jag är villig att ge till goda ändamål utan att förvänta mig något i ersättning" *

Mark only one oval.

	1	2	3	4	5	
Inte alls	◯	◯	◯	◯	◯	Mycket väl

25. Föreställ dig denna situation: Idag får du helt oväntat 10000kr. Hur mycket skulle du ge bort till ett gott ändamål? *

Mark only one oval.

◯ 0
◯ 500
◯ 1000
◯ 1500
◯ 2000
◯ 3000
◯ 4000
◯ 5000
◯ 6000
◯ 7000
◯ 8000
◯ 9000
◯ 10000

26. Hur väl överrensstämmer påståendet med din uppfattning: "Min inviduella påverkan på klimatet gör ingen betydande skillnad på det stora hela. Jag, som individ, kan inte påverka den globala uppvärmningen" *

Mark only one oval.

	1	2	3	4	5	
Inte alls	◯	◯	◯	◯	◯	Mycket väl

Sida 5/5

27. Politiskt står jag.. *

Mark only one oval.

◯ Mer till vänster

◯ Mer i mitten

◯ Mer till höger

◯ Other: _____

28. Ser du dig själv främst som en invånare av Sverige eller av världen? *

Mark only one oval.

	1	2	3	4	5	
Sverige	◯	◯	◯	◯	◯	Världen

29. Hur väl överrensstämmer påståendet med din uppfattning: "Jag och andra som bor i Sverige måste göra (fler) personliga uppoffringar för att motverka den globala uppvärmningen" *

Mark only one oval.

	1	2	3	4	5	
Inte alls	◯	◯	◯	◯	◯	Mycket väl

30. Av 100 svenskar, hur många vill ha striktare statliga åtgärder för att motverka den globala uppvärmingen? *

Mark only one oval.

◯ 10
◯ 20
◯ 30
◯ 40
◯ 50
◯ 60
◯ 70
◯ 80
◯ 90
◯ 100

31. Jämfört med utsläppsnivån som behövs för att nå målet på 1,5 °C - hur mycket
    släpper Sverige för närvarande ut per person och år? *

    Mark only one oval.

    - ( ) 10 gånger mindre
    - ( ) 7 gånger mindre
    - ( ) 5 gånger mindre
    - ( ) 2 gånger mindre
    - ( ) Ungefär samma
    - ( ) 2 gånger mer
    - ( ) 5 gånger mer
    - ( ) 7 gånger mer
    - ( ) 10 gånger mer