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Public support for air travel restrictions to address COVID-19 or climate change

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A R T I C L E I N F O

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A B S T R A C T

An improved understanding of public support is essential to design effective and feasible climate policies for aviation. Our motivation is the contrast between high support for air travel restrictions responding to the COVID-19 pandemic and low support for restrictions to combat climate change. Can the same factors explain individuals' support for restrictive measures across two different problems?

Using a survey, we find that largely the same factors explain support. Support increases with expected effectiveness, perceived threat and imminence of the problem, shorter expected duration of the measure, knowledge, and trust, while support decreases with expected negative consequences for self and the poor. When controlling for all perceptions, there is no significant residual difference in support depending on whether the measures address climate change or COVID-19. The level of support differs because COVID-19 is perceived as a more imminent threat, and because measures are expected to be shorter-lasting and more effective.

1. Background

In 2011, aviation made up 3.5% of the anthropogenic forcing of climate (Lee et al., 2021). Prior to the COVID-19[1] pandemic, the aviation industry forecasted a 4.4% annual growth in air traffic for the next twenty years (Airbus, 2018). The long-term annual improvement in fuel efficiency of over 2% per year (ibid) is insufficient to offset the growth in volume, resulting in continued high growth in emissions (Staples et al., 2018). The projected emissions growth is inconsistent with the steep emissions reductions needed to reach the global climate targets established by the Paris Agreement. Even if the industry's own goal of carbon neutral growth for international aviation emissions from 2020 onwards (ICAO, 2010) is met, CO_2 emissions from aviation will consume 4–15% of the carbon budget between 2015 and 2050 for scenarios that limit warming to less than 2 °C (Lee, 2018). These pre-COVID-19 projections might overestimate future emissions from aviation under business-as-usual as the response to the pandemic has resulted in a very substantial drop in global air traffic, reducing CO_2 emissions by around 60% in April 2020 (Le Quere et al., 2020). It has been projected that air traffic (and emissions) will return to pre-pandemic levels within 3–4 years and thereafter continue to grow, albeit more slowly than earlier projections have shown (Roland Berger, 2020).

Research on mitigation in the aviation sector has tended to focus on technical and operational solutions such as rerouting and altering cruising altitudes (Dahlmann et al., 2016; Grewe et al., 2017), and alternative jet fuels (Deane and Pye, 2018; Hassan et al.,

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[1] COVID-19 is the disease caused by the coronavirus (more accurately SARS-CoV-2). For simplicity we always refer to COVID-19 in the main text.

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2018; Kousoulidou and Lonza, 2016). The IPCC therefore stressed that “a better knowledge of consumer travel behaviour is needed, particularly for aviation” (Sims et al., 2014), and there has been increased attention to this topic in recent years (Becken and Mackey, 2017; Filimonau and Högström, 2017; Higham et al., 2014). Much more knowledge is still needed for the sector to be able to make a significant contribution to the global mitigation effort, including with respect to what demand-side measures are supported by the public.

By contrast to the findings from the literature on public support for climate policy (Drews and van den Bergh, 2016), the severe travel restrictions imposed by governments to limit the COVID-19 pandemic seem to have enjoyed high public support (Ipsos, 2020). Naumann et al. (2020) find that in March 2020, around 90% of Germans supported bans on international travel, but this supported had dropped by 25 percentage points by May 2020. The high level of support is interesting, as both infection control and climate mitigation involve curtailing individual behaviour for public benefit, and thus contain a collective action element. However, Vinke et al. (2020) point out some key differences, noting that “because the threats of the COVID-19 pandemic are perceived as imminent and personal and measures are expected to last only a few months, they are easier to implement than the long-term, albeit less drastic, changes that are necessary for protecting the climate in the apparently distant future” (p. 4). They argue that whereas people have been willing to adopt (drastic) short-term lifestyle change to halt the pandemic, people have been “reluctant to commit even to smaller long-term changes to avert the climate emergency” (p. 5).

Norway already has some of the world’s most stringent policies in place to limit greenhouse gas emissions from air travel. Flights within Europe are subject to the EU Emissions Trading System. Domestic flights in Norway in addition face a CO_2 tax of around €50 per ton of CO_2. From 2020 there is also a blending mandate, requiring a share of at least 0.5% advanced biofuels in all jet fuel sold in Norway.[2]

Since March 2020 the Ministry of Foreign Affairs in Norway has advised against non-essential travel, initially for travel to all countries, but from June 15 exemptions were made for travel to the Nordic countries and regions, and from July 15, 2020 the exemptions were extended another 26 European countries. However, the exemptions were in effect only provided that the rate of new infections in the country was below a given threshold.[3] Anyone arriving in Norway from non-exempt countries was quarantined for 10 days. Travel insurance was generally not valid for travels to non-exempt countries.

The contrast between the apparent high support for (air) travel restrictions in response to the pandemic and the low support for air travel restrictions to combat climate change is the motivation for this study: Can the same factors explain individual support for restrictive measures across two very different problems (climate change and the COVID-19 pandemic), or are there explanatory factors specific to each problem that make it challenging to model support in the same framework? If the same model can explain support for different problems, it would facilitate the transfer of insights across different fields of research. We also investigate which perceived differences between climate change and COVID-19 explain differences in support for travel restrictions across the two issues.

In this paper we first explore the existing research on public support for climate policies with particular attention paid to support for policies aiming to reduce the climate impact of aviation. We then describe our survey design, methods and present our descriptive results before analysing the factors that lead to support (or lack thereof) for policies that restrict leisure air travel.

2. Literature review

There is a large and rapidly growing literature on public support for climate policies. This section reviews the literature to identify factors that have been shown to influence the level of public support for climate, energy and transport policies, as a basis for deciding which factors to include in our analysis. Because of the size of the literature, we adopt the categorization from Drews and van den Bergh’s (2016) comprehensive review, which consists of three factors: Socio-psychological factors and climate change perception; perception of climate policy and its design; and contextual factors. The Roman numerals in parenthesis in this review are used later to relate findings from the literature to our hypotheses.

Among the *socio-psychological factors*, Drews and van den Bergh (2016) highlight general personal orientation (with left-wing political orientation and environmental values typically leading to increased policy support) and climate change beliefs (belief in anthropogenic climate change increasing policy support) (I). The belief in anthropogenic climate change has been shown to increase with more global or cosmopolitan values (Devine-Wright et al., 2015) (II). Furthermore, people who hold populist attitudes are more likely to reject climate policies (Huber, 2020) (III), and people with right-wing authoritarian beliefs such as scepticism towards immigration are less likely to believe in anthropogenic climate change (Krange et al., 2018) (IV). A number of studies have found that people tend to view policies more positively after they have experience with the policy (Schuitema et al., 2010). When it comes to *climate change perceptions*, Drews and van den Bergh (2016) find that policy support tends to increase with “beliefs in present/soon and severe impacts, at personal and societal level” (V and VI). This is particularly relevant for our study, as the COVID19 pandemic offers a valuable opportunity to explore support for restrictive measures in a setting where we expect the perceived risk to self, family and community to be both higher and more immediate than for climate change.

Among the factors relating to *perception of climate policy and design*, Drews and van den Bergh (2016) highlight that people tend to prefer non-coercive (“pull”) policies over more coercive (“push”) policies, a preference that “may be explained by the lower perceived

[2] In addition, there is a fiscally motivated air passenger tax of around €7 (€19) per passenger for flights to countries with a capital city less (more) than 2500 km from Oslo and for all destinations in EEA countries.

[3] At the time the survey was implemented (September 2020) only Iceland, Greenland, Latvia, Lithuania, and some regions in Sweden and Denmark met this criterion.

financial and behavioural costs to the individual" (VII). As our survey will focus on restrictions (coercive policies), this factor is particularly relevant, including the finding that policies targeting behaviors that require low behavioral cost to change (such as recycling) were more popular than those targeting high-cost behaviors (such as driving) (de Groot and Schuitema, 2012). Another clear finding from the review by Drews and van den Bergh is that policy support depends on the degree to which people expect the policy to be effective in changing the targeted behaviour (VIII), although perceived effectiveness might not match actual effectiveness, as "there seems to be a negative bias in the opinion of respondents on the effectiveness of measures which aim at influencing their behaviour" (Rienstra et al., 1999). The perceived cost of the policy is a third aspect of *perception of climate policy and design*, including issues such as actual versus perceived costs, the use of revenues (Baranzini and Carattini, 2017), and how policies impact the poor (Kallbekken and Sælen, 2011) (IX). Curbing aviation demand has been labelled as negative for poor countries in the political discourse, although this claim finds weak support in research (Peeters and Eijgelaar, 2014). Aspects of perceived fairness apart from distributional impact may also predict policy support, but will not be explored in this study.

Among the *contextual factors*, trust is a key variable, with "considerable evidence to suggest that policy support requires trust in government and politicians" (Drews and van den Bergh, 2016) (X). Relationships between support for climate policy and different socio-economic factors have been documented in a number of studies, and although the findings are not always consistent across studies, support typically decreases with age (Douenne and Fabre, 2020) (XI), increases with income (XII) and is higher among females (Sonnenschein and Smedby, 2019) (XIII).

A highly relevant strand of research has examined the effect of reframing the motivation for climate policies to emphasize other benefits, such as public health, job creation or technological innovation, with mixed results. Petrovic et al. (2014), for instance, find that "health is a stronger motivator of attitude change than climate change among conservative individuals." By contrast, Bernauer and McGrath (2016) find that reframing climate policies in terms of economic co-benefits, community building or health benefits is unlikely to boost public support. Cohen and Kantenbacher (2019) suggest that a focus on the personal health co-benefits of flying less might be more salient for frequent flyers than the environmental benefits, and therefore potentially more effective in engendering behavioural change.

Aviation has until recently received very little attention within the literature on public support for climate policy, with the exception of the specific issue of willingness to pay for voluntary carbon offsets (Brouwer et al., 2008; Choi and Ritchie, 2014; Lu and Shon, 2012; MacKerron et al., 2009). The study by Kantenbacher et al. (2018) is probably the most comprehensive assessment of public support for alternative mitigation policies for aviation. They explore public support for 14 aviation mitigation policies among the UK public, and find that "the least popular options are hard policies that directly affect the individual, including increased taxes and limits on certain travel options." In other words, they find that some of the policies expected to be most efficient in reducing emissions are also among the least popular, and they are therefore likely to be politically challenging to implement. In addition to the finding that the most coercive policies are the least popular, their survey in the UK showed that there is significant support for a number of policies, "particularly those that place financial or regulatory burdens on industry rather than on individuals directly", and that support is weaker among people who fly more frequently (XIV and XV), and slightly higher for people with higher education (at least a first degree) (XVI).

In a similar vein, Larsson et al. (2020) conducted an online survey on public support for seven different aviation policies in Sweden. They find that the less coercive measures (e.g., labelling and subsidies) and regulations targeting other groups than the public (e.g., biofuel blending mandates for the aviation industry) receive higher support than stringent market-based policies (personal carbon allowances and frequent flyer taxation). Personal attributes that increase public support include climate concern, left-wing political orientation and high levels of institutional trust. It is noteworthy that despite the findings on coerciveness, the expected effect on one's own personal freedom had a very weak correlation with policy support.

Higham et al. (2016) conducted in-depth interviews in Norway, the UK, Germany and Australia, finding divergence across the four countries in the willingness to accept regulatory measures: They found widespread support for introducing taxes on air travel only in Norway, whereas in the three other countries they found wide support only for "softer strategies that are not perceived as restricting individual freedoms to travel". This finding is of particular relevance for the generalizability of our results as our survey was conducted in Norway.

Sonnenschein and Smedby (2019) investigated the willingness to pay mandatory air tickets surcharges in Sweden. The willingness to pay was higher among those who were not frequent flyers, among women, and those with left-wing political orientation. They concluded that "a mandatory air ticket tax is a viable policy option that might receive majority support among the population."

An important final note is that policy makers do not necessarily rely on majority support in order to implement a policy (except for instance when the issue needs to be decided in a referendum), nor is majority support always sufficient, as powerful interest groups, political parties and elites also influence policy outcomes. The influential review by Burstein (2003) of studies on the impact of public opinion on policy, summarizes the literature succinctly: "No one believes that public opinion always determines public policy; few believe it never does."

3. Methods

We conducted an online survey with a sample of the adult Norwegian population in September 2020, with 1010 respondents, implemented by the survey company YouGov. Before starting the survey, respondents were provided with information about the survey's purpose, what participating would mean for them, and the researchers' contact information to obtain additional information. The questionnaire contained 7 questions relating to leisure air travel restrictions motivated by mitigating climate change, 7 parallel (as near identical as possible) questions relating to air travel restrictions motivated by minimizing the spread of COVID-19, with the order of the two blocks randomized to control for any order effects, and a further 6 general questions, supplemented by 8 socio-economic questions already answered by the survey panel members. An English translation of the full questionnaire is provided in the Supplementary material.

The survey company provided a poststratification weighting variable from comparing the sample with the Norwegian population in terms of gender, age, and geographic residence. People in the age group 18–29 are somewhat underrepresented in the sample, and are weighted up by on average 8%. This group is typically the most difficult to recruit to surveys in Norway. In terms of gender and geography, the sample univariate distributions accurately reflect those of the population. We will use these weights in the analysis, to make the results representative for the Norwegian population with respect to above-mentioned variables. The standard deviation of the weight variable is 0.19.

3.1. Survey design and research questions

Leveraging expected differences in support for restrictions motivated by climate change and by the COVID-19 pandemic, we explore what explains support for leisure air travel restrictions. We chose air travel because it has the highest climate impact per passenger km of all travel modes and is the only relevant mode for long-distance travel to and from Norway. We chose *leisure* air travel because leisure travel is to a much larger extent a discretionary decision taken by the individual alone than business travel is, and a much larger proportion of the population travel by air for leisure than for business.

We have two core research questions that we will address, supported by 21 hypotheses.

1. Can the same factors explain individual support for restrictive measures across two very different problems (climate change and the COVID-19 pandemic), or are there explanatory factors specific to each problem that make it challenging to model support in the same framework?
2. What perceived differences between climate change and COVID-19 explain differences in support for travel restrictions across the two issues?

To explore these two research questions, the survey contains two items measuring support for restrictive measures (our outcome variables) and several items eliciting values for our explanatory variables. The two items used to create our outcome variable are:

> *To what extent do you agree that the government should implement measures that limit leisure travel by plane, to limit greenhouse gas emissions, resulting in i.a. that you would have to make fewer trips abroad by plane than you otherwise would have?*
>
> *To what extent do you agree that the government should implement measures that limit leisure travel by plane, to limit the spread of COVID-19, resulting in i.a. that you would have to make fewer trips abroad by plane than you otherwise would have?*

Table 1 below lists the explanatory variables used in the analysis and our hypotheses concerning how these variables influence the outcome variables (relationship indicated by positive or negative sign). The hypotheses are informed by previous findings in the literature, as indicated by the Roman numerals in the literature review. The alphanumerical codes refer to the relevant questions in the questionnaire (see Appendix). In addition to the variables presented here, we also collect data on political party preferences to explore how politically polarizing the two problems are, although these are not included in the regression models to avoid potential endogeneity.

For the second research question, there is very limited pre-existing evidence to build on beyond some relationships suggested by Vinke et al. (2020). We hypothesize that difference in support (for restrictions motived by climate change and by the COVID-19 pandemic) correlates positively with differences in:

H18) Expected duration of measures (Q3 and Q10).
H19) Expected effectiveness of measures (Q4 and Q11).
H20) Magnitude of threat (Q5.1–4 and Q12.1–4).
H21) Imminence of threat (Q6 and Q13).

3.2. Statistical analysis

The outcome variables – support levels for restrictive measures – are ordinal, which means that ordered logistic regressions are an appropriate model for most of our analyses (Hill et al., 2008). We make an exception for the model of the difference in individual support levels across climate change and COVID-19 as a function of different perceptions about the two sets of problems and measures. Both the outcome and explanatory variables in this model take values between −4 and 4 as they measure the difference between two items measured on a 5-point Likert scale. This creates a variable that is closer to a continuous variable compared with the responses to each singular question, as the range is doubled, and the number of extreme value observations falls drastically. Ordinary least square regression is used for this variable, for its simplicity and intuitive interpretation[4].

In a joint model of responses to both policy questions, we allow for intercorrelations among the two observations of the same

[4] While this variable is not technically interval scale, as assumed in OLS, several studies show that standard correlation analysis is robust to violations of the scale assumption (see Norman 2010), which likely generalizes to linear regression as well.

Table 1
Short description, question identifier, dummy variable, hypothesized relationship with outcome variables, and supporting finding in literature for the explanatory variables.

Variable	Question(s)	Dummy variable = 1 for respondents answering…	Hypothesis no. and change in outcome	Finding in literature
Short expected duration	Q3/Q10	“A few weeks” or “A few months”	H1 +	
Expected Effectiveness of Measures	Q4/Q11	“Partly agree” or “Fully Agree”	H2 +	VIII
Perceived Threat to Self	Q5.1/Q12.1	“To a fairly large degree” or “To a very large degree”	H3a +	VI
Perceived Threat to Local Community	Q5.2/Q12.2	“To a fairly large degree” or “To a very large degree”	H3b +	VI
Perceived Threat to Norway	Q5.3/Q12.3	“To a fairly large degree” or “To a very large degree”	H3c +	VI
Perceived Threat to World	Q5.4/Q12.4	“To a fairly large degree” or “To a very large degree”	H3d +	VI
Perception of Imminence	Q6/Q13	“Immediately or in the very near future’ or “The next few years”	H4 +	V
Issue knowledge	Q7/Q17	“4″ or “5 – Very much knowledge”	H5 +	I
Trust in Information from Government	Q8.1/Q15.1	“To a fairly large degree” or “To a very large degree”	H6a +	X
Trust in Information from Science	Q8.2/Q15.2	“To a fairly large degree” or “To a very large degree”	H6b +	X
Expected Negative Consequence of Measures for Self	Q16.1	“To a fairly large degree” or “To a very large degree”	H7 −	VII
Expected Negative Economic Consequence of Measures for the Poor	Q16.2	“To a fairly large degree” or “To a very large degree”	H8 −	IX
Planet first	Q17.2 & Q17.3	Stronger attachment to “the whole world” than to “Norway”	H9a +	II
Country First	Q17.2 & Q17.3	Stronger attachment to “Norway” than to “the whole world”	H9b −	II
Nativism[1]	Q18.1	“Corresponds poorly” or “Corresponds very “poorly”	*H*10 +	IV
Populism	Q18.2	“Corresponds fairly well” or “Corresponds very well”	*H*11 +	III
Leisure Air Travels	Q19	continuous variable	H12 −	XIV
Business Air Travels	Q20	continuous variable	H13 −	XV
Female	Panel background	“Female”	H14 +	XIII
Age	Panel background	continuous variable	H15 −	XI
Higher Education	Panel background	“University level”	H16 +	XVI
Household Income	Panel background	continuous variable	H17 +	XIII

[1] Question formulation: “It is important for me not to hold prejudices against immigrants.”

respondent as well as any type of heteroskedasticity across respondents, by using a random effects ordered logit with White’s heteroskedasticity correction applied to the pairs of observations of the same respondent (see Hill et al., 2008, p. 401).

4. Results

4.1. Descriptive results

Table 2 shows the breakdown of responses for the two outcome variables in our study. In line with our expectations, support is higher when the motivation is to limit the spread of COVID-19 – fully 70.2% of respondents partially or completely agree the government should limit leisure travel by plane. However, a majority of 51.7% also supports limits on leisure travel by plane motivated by limiting GHGs.

Table 3 lists the mean and standard deviation for the explanatory variables, both for the original responses (for 5-point Likert scale questions higher numbers indicate higher levels of agreement with the statement) and for the dummy-coded variables defined in Table 2. There are important differences in responses between the climate-related and the COVID-related questions. Nearly 2/3 expect that measures introduced to limit the spread of COVID-19 will last less than a year, and less than 1/3 expect such a short duration if introduced to limit GHG emissions. 52% of respondents fully agree that the measures would be effective in limiting the spread of COVID-19, whereas 29% do so for limiting GHG emissions. 52% also see COVID-19 as a threat in the immediate and near future, compared with only 11% for climate change). Differences are, on the other hand, smaller than anticipated when it comes to the perceived threat to yourself and your family, the local community, Norway and the world.

Fig. 1 illustrates that COVID-19 is a far less polarizing issue than climate change in Norway. However, whereas differences across party voter groups are smaller for COVID-19, the ordering of parties is quite similar across the two issues, except for two small parties,

Table 2
Response frequencies for the outcome variables.*

To what extent do you agree the government should implement measures that limit leisure travel by plane, to…	…limit GHG emissions	…limit spread of COVID-19
Completely disagree	16.6%	7.5%
Partially disagree	12.5%	8.0%
Neither agree nor disagree	16.9%	12.2%
Partially agree	24.6%	23.6%
Completely agree	27.1%	46.6%
Don't know	2.4%	2.0%

* N is 1010.

Table 3
Mean responses for the explanatory variables (weighted).*

Variable	Climate context mean response (st.dev.)	COVID-19 context mean response (st.dev.)	Climate context dummy mean (st.dev.)	COVID-19 context dummy mean (st.dev.)
(Short) expected duration	3.6 (1.4)	2.9 (0.9)	0.27 (0.44)	0.66 (0.47)
Expected Effectiveness of Measures	3.6 (1.3)	4.2 (1.0)	0.61 (0.49)	0.81 (0.39)
Perceived Threat to Self	3.1 (1.2)	3.4 (1.1)	0.39 (0.48)	0.52 (0.50)
Perceived Threat to Local Community	3.2 (1.2)	3.5 (1.0)	0.43 (0.50)	0.57 (0.49)
Perceived Threat to Norway	3.4 (1.2)	3.8 (1.0)	0.52 (0.50)	0.68 (0.47)
Perceived Threat to World	3.9 (1.2)	4.2 (1.0)	0.70 (0.46)	0.82 (0.38)
Perception of Imminence	1.3 (0.9)	2.4 (0.8)	0.28 (0.44)	0.87 (0.33)
Issue knowledge	3.4 (0.9)	3.7 (0.8)	0.39 (0.49)	0.57 (0.50)
Trust in Information from Government	3.2 (1.1)	3.8 (1.0)	0.41 (0.49)	0.71 (0.45)
Trust in Information from Science	3.7 (1.1)	4.1 (0.9)	0.62 (0.49)	0.78 (0.42)
Expected Negative Consequence of Measures for Self	3.0 (1.2)		0.37 (0.48)	
Expected Negative Economic Consequence of Measures for the Poor	3.3 (1.2)		0.44 (0.50)	
Planet first/Attachment to the whole world	3.5 (1.0)		0.14 (0.35)	
Country First/Attachment to Norway	4.1 (0.9)		0.46 (0.50)	
Nativism	3.7 (1.1)		0.12 (0.33)	
Populism	3.4 (1.1)		0.48 (0.50)	
Leisure Air Travels	2.9 (3.8)		n.a.	
Business Air Travels	1.5 (4.2)		n.a.	
Female	0.50 (0.50)		n.a.	
Age	48 (17)		n.a.	
(Higher) Education	2.8 (0.9)		0.57 (0.50)	
Household Income (Thousand NOK)	711 (373)		n.a.	

* Columns 2 and 3 excludes «don't know" responses, thus N varies between rows. See the Supplementary material for complete question formulation and response alternatives.

the Christian Democrats and the Anti toll road party, which are outliers in the COVID-19 and climate dimension, respectively. In line with greater polarization, the variance is also consistently higher in the climate context on the items used as explanatory factors, as shown by the standard deviations in Table 3.

4.2. Separate logit models

To identify covariates of support for air travel restrictions to address climate change and COVID-19, we first run separate models for the two issues. Because the outcome variable is ordinal, we employ ordered logistic regressions. Respondents who answered "don't know" to these questions are excluded from the analysis. The explanatory variables are derived from hypotheses 1–17. Most of these variables are also ordinal. We convert them into dummy variables as outlined in Table 2, while the complete questions and response alternatives are provided in the Supplementary materials. We also include a variable to control for which thematic batch of questions the respondents answered first (climate change or COVID-19), to take into account potential anchoring effects (the order was assigned randomly).

Table 4 shows that the following variables have estimated coefficients significantly different from zero at the 5% confidence level

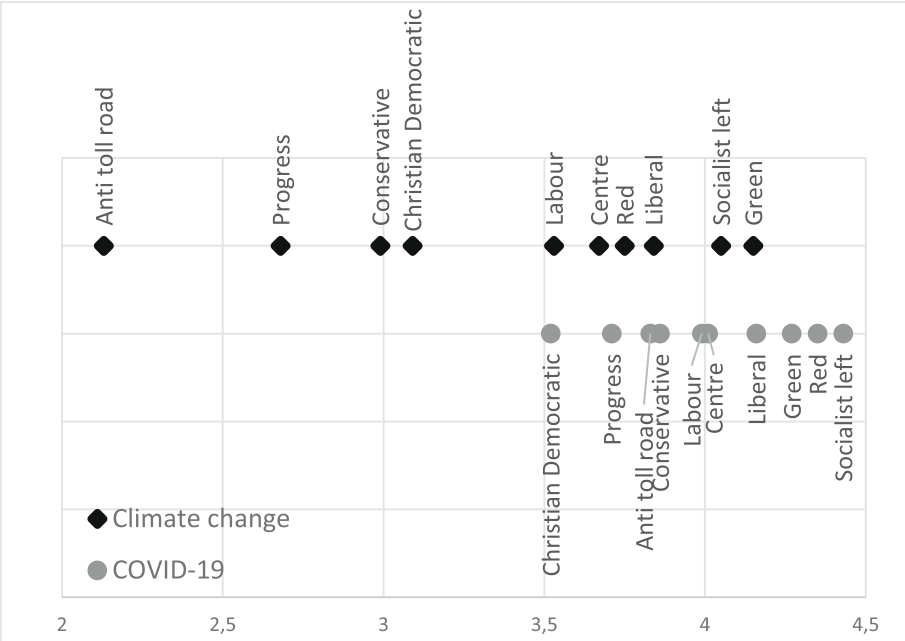

Fig. 1. Mean agreement with measures to limit leisure air travel by political party affiliation.

for both climate and COVID-19 measures: *Expected Effectiveness of Measures, Perceived Threat to Self* (from respectively climate change or COVID-19)*, Expected Negative Consequences of Measures for Self, Expected Negative Economic Consequences of Measures for the Poor, and Female* (providing support for H2, H3a, H7, H8 and H14). The estimated coefficient for *Received COVID-19 Questions First* is significantly positive in both models, picking up an order effect. The direction of the effect corresponds to the relatively greater support for measures addressing COVID-19 and suggests an anchoring effect to the first response given[5]. Additional variables that are significant predictors only for measures addressing climate change are *Short Expected Duration*, *Perceived Threat to Local Community, Perceived Threat to Norway, Perception of Imminence, Planet First,* the respondents' frequency of *Leisure Air Travels and Higher Education* (providing support for H1, H3b, H3c, H4, H9a, H12 and H16) for the case of climate change). Variables that are significant predictors only for measures addressing the COVID-19 pandemic are *Perceived Threat to the World, Trust in Information from Government,* and *Nativism* (providing support for H3d, H6a and *H*10 for the case of COVID-19). While the above-mentioned variables are significant predictors only in one model, their sign is consistent across both models. The only exception is perception of imminence, which is essentially zero in the COVID-19 model. The reason is probably that almost everyone (87%, see Table 3) sees it as an imminent threat, unlike climate change, so this variable could hardly explain variation in policy support. The strongest predictor is in both cases is *Expected Effectiveness,* judged from the absolute coefficient size.

The variables that do not have significant coefficients in any of the two separate models are *Issue Knowledge* (H5), *Trust in Information from Science* (H6b), *Country First* (H9b), *Populism* (*H*11), *Business Air Travels* (H13), *Age* (H15) and *Household Income* (H17).

Table 4 indicates that support for restrictive measures have little relationship with sociodemographic variables except gender. From the perspective of self-interest, it is surprising that frequent flying does not correlate stronger with policy support; only leisure travel turns out significant, and only for measures addressing climate change. To increase the statistical power, we run a model with only the sociodemographic variables (Table 5). This means estimating the gross effect of these variables without controlling for stated perceptions. For climate, two more variables are now significant: *Age* and *Household income*. The effect of income is very small and actually in the opposite direction of what we hypothesized. This means that people with lower income are stronger supporters of the policy measures than people with higher income, even when the frequency of air travels is controlled for. For COVID-19 measures, *Leisure Air Travels* turns significant, but apart from that, the relationship between sociodemographic variables and policy support is confirmed to be weak. *Higher Education* and Business Air Travels do not appear to have any relation with policy support in this analysis, whether relating to climate or COVID-19. In summary, many of our hypotheses regarding effects of socioeconomic variables are not supported by the data, and the socioeconomic divides are smaller in relation to COVID-19 than climate change.

[5] Because the order effect is quite pronounced, we checked how the results change if we include only the first thematic question batch for each respondent, so that responses could not be affected by having answered questions on the other theme first. This does not change the sign of any coefficients that were significantly different from zero in the original model. Only four non-significant coefficients change sign. The number of significant coefficients is reduced by half, which is unsurprising given that the sample size is also reduced by half. Overall, we conclude that the order effect does not produce bias in our results.

Table 4
Ordered logistic regressions where the outcome variables are support levels for restrictions on air travel addressing, respectively, climate change and COVID-19.[#]

	Climate change		COVID-19	
Variable	Estimated coefficient	p-value	Estimated coefficient	p-value
Short expected duration	0.26*	0.080	−0.01	0.921
Expected Effectiveness of Measures	1.85***	0.000	1.74***	0.000
Perceived Threat to Self	0.54***	0.007	0.37**	0.022
Perceived Threat to Local Community	0.52***	0.007	0.24	0.181
Perceived Threat to Norway	0.39**	0.030	−0.13	0.500
Perceived Threat to World	0.16	0.382	1.05***	0.000
Perception of Imminence	0.35**	0.019	−0.02	0.936
Issue knowledge	0.16	0.237	−0.01	0.919
Trust in Information from Government	0.26*	0.077	0.44***	0.008
Trust in Information from Science	0.00	0.999	0.12	0.478
Expected Negative Consequence of Measures for Self	−0.72***	0.000	−0.29**	0.048
Expected Negative Economic Consequence of Measures for the Poor	−0.26*	0.053	−0.35**	0.012
Planet First	−0.29*	0.077	−0.29	0.126
Country First	−0.22	0.119	0.00	0.980
Nativism	−0.04	0.850	−0.48**	0.017
Populism	−0.08	0.535	0.05	0.740
Leisure Air Travels	−0.05**	0.010	−0.02	0.271
Business Air Travels	0.02	0.283	0.01	0.657
Female	0.52***	0.000	0.41***	0.002
Age	0.00	0.296	0.00	0.845
Higher Education	−0.22*	0.080	−0.05	0.730
Household Income	0.00	0.922	−0.01	0.690
Received COVID-19 Questions First	0.77***	0.000	0.30**	0.023
McFaddens pseudo-R2	0.19		0.15	

[#] Coefficients that are significantly different from zero at confidence levels 0.1, 0.05, and 0.01 are marked with *, **, and ***, respectively. N is 977 for Climate change and 981 for COVID-19. (Respondents answering don't know" on the questions measuring the dependent variables are excluded).

4.3. Model of differences in support across climate and COVID-19 measures

Next, we investigate possible explanations for the difference in policy support across the two issues. Because all respondents were asked a series of parallel questions regarding climate change, we can construct a set of variables that measure individual differences in responses. The outcome variable thus becomes the difference in degree of support for governmental measures that restrict leisure air travel depending on whether they address COVID-19 or climate change (see question formulations at the start of Section 3). The explanatory variables are the differences across the two issues in *Expected Duration of Measures, Expected Effectiveness of Measures, Perceived Effectiveness, Perceived Threat to Self, Perceived Threat to Local Community, Perceived Threat to Norway, Perceived Threat to the World, Perception of Imminence, Issue Knowledge, Trust in Information from Government, Trust in Information from Scientists*. We also control for the order of the question batches.

As shown in Table 6, our hypotheses regarding duration of measure (H18), effectiveness of measure (H19), and imminence of threat (H21) are supported, as estimated coefficients are significantly different from zero. This indicates that support is higher in relation to measures addressing COVID-19 because it perceived as a more imminent threat, and because measures are expected to be shorter-lasting and more effective. As in the separate models, the strongest effect is from *Perceived Effectiveness.* Our final hypothesis regarding the threat magnitude (H20) is only partially supported, as only difference in *Perceived Threat to Norway* is significant. In addition to the hypothesized explanations, greater *Trust in Information from Government* also seems to contribute to greater support for COVID-19 measures. Lastly, the order effect is again significant, whereby respondents who answered the COVID-19 questions before the climate questions state more equal support for measures across the two domains than respondents who received questions in the opposite order.

4.4. Joint model

Finally, we investigate whether we can model policy support in general, as a function of the perceived attributes of the problem and measures. We pool together each respondent's answers to each question that was asked in parallel regarding climate change and COVID-19. We thus have two observations for each respondent. A dummy variable tags the observations in the climate change context.

The most important result from Table 7 is that the dummy variable for climate change is not significant. This means that after controlling for differences in perceptions across the two problems, there is no significant residual difference in support depending on whether the measures address climate change or COVID-19. Thus, the same model appears able to explain policy support across the two domains. This model indicates that policy support is a positive function of *Expected effectiveness* of measures; the *Perceived Threat* to *Oneself*, to the *Local Community*, and to *The World*; the *Perceived Imminence* of the threat; and *Trust in Information from Government* on the issue; while a negative function of the perceived *Negative Consequences of measures for Self* and *Negative Economic Consequences of measures for the Poor*. In addition, the order effect is again significant. Consistent with the above models, the strongest predictor is

Table 5
Ordered logistic regressions for sociodemographic regressors only.#

Variable	Climate change		COVID-19	
	Estimated coefficient	p-value	Estimated coefficient	p-value
Leisure Air Travels	−0.09***	0.000	−0.06***	0.000
Business Air Travels	0.02	0.403	−0.02	0.124
Female	0.55***	0.000	0.70***	0.000
Age	−0.01***	0.000	0.00	0.858
Higher Education	−0.02	0.891	−0.05	0.688
Household Income	−0.0003**	0.021	0.0000	0.867
Received Corona Questions First	0.67	0.000	0.33***	0.007
McFaddens pseudo-R2	0.02		0.02	

Coefficients that are significantly different from zero at confidence levels 0.1, 0.05, and 0.01 are marked with *, **, and ***, respectively. N is 977 for Climate change and 981 for COVID-19.

Table 6
Ordinary least squares regression where the outcome variable is difference in support across the two policy domains and explanatory variables are differences in perceptions across the domains.#

Variable	Support for air travel restrictions	
	Estimated coefficient	p-value
Expected duration of Measures	−0.10**	0.033
Expected Effectiveness of Measures	0.30***	0.000
Perceived Threat to Self	−0.04	0.472
Perceived Threat to Local Community	0.08	0.177
Perceived Threat to Norway	0.16**	0.037
Perceived Threat to World	−0.08	0.270
Perception of Imminence	0.11**	0.043
Knowledge	0.01	0.844
Trust in Information from Government	0.13**	0.047
Trust in Information from Science	0.11	0.100
Received COVID-19 Questions First	−0.46***	0.000
R^2	0.18	

N is 679. This excludes respondents who answered “don’t know” to Q3, Q7, Q10 or Q14, as this response could not be ordered relative to other response options on these questions. Coefficients that are significantly different from zero at confidence levels 0.1, 0.05, and 0.01 are marked with *, **, and ***, respectively.

Table 7
Random effects ordered logistic regressions with robust standard errors clustered on individuals. The outcome variable is support levels for restrictions on air travel in general.#

Variable	Support for air travel restrictions	
	Estimated coefficient	p-value
Short expected duration	0.21	0.086
Expected Effectiveness of Measures	2.01***	0.000
Perceived Threat to Self	0.42***	0.004
Perceived Threat to Local Community	0.53***	0.000
Perceived Threat to Norway	0.22	0.102
Perceived Threat to World	0.61***	0.000
Perception of Imminence	0.43***	0.001
Issue knowledge	0.06	0.555
Trust in Information from Government	0.39***	0.003
Trust in Information from Science	0.09	0.510
Expected Negative Consequence of Measures for Self	−0.68***	0.000
Expected Negative Economic Consequence of Measures for the Poor	−0.36***	0.002
Climate change	−0.19	0.102
Received COVID-19 Questions First	0.63***	0.000

The number of observations included (N) is 1976 (from 1004 different respondents). Coefficients that are significantly different from zero at confidence levels 0.1, 0.05, and 0.01 are marked with *, **, and ***, respectively.

Expected Effectiveness. The model does not find significant effects for the *Expected Duration of Measures*, *Perceived Threat to Norway, Issue Knowledge,* or *Trust in information from Science.*

5. Discussion

Our results confirm many of the findings we identified in the literature review (Section 2). Some our most important findings merit further discussion, in particular where our results deviate from previous findings.

We find the expected effectiveness of a measure to be a very powerful predictor of support, in line with previous research. It should be noted that this may pick up an element of 'wishful thinking' (Drews and van den Bergh, 2016), as individuals who are opposed to a policy for other reasons may carry this preference with them when forming their beliefs about the policy's effectiveness.

One of our main findings is that the same explanatory factors explain support for measures motivated by climate change and by COVID-19. The level of support, however, differs because COVID-19 is perceived as a more imminent threat, and because measures are expected to be shorter-lasting and more effective. One additional reason for this finding could be that the COVID-19 measures already in place more closely resemble the (general) restrictions we ask the survey respondents about, and it is well established that support tends to increase with experience (Schuitema et al., 2010).

Our results also highlight that COVID-19 seems to be a far less politically polarizing issue than climate policy, both across political party preferences and across age, income, and frequency of flying. Voters' views on climate change are highly polarized on the political left–right dimension in the USA (Dunlap et al., 2016), with a similar though less pronounced divide in western European countries (McCright et al., 2016). In Norway, climate policy is arguably becoming a central political dividing line at the same time as the traditional left–right division is becoming less important (Bonde, 2019). Party polarization has been much less evident in the Norwegian political debate on COVID-19, which is reflected in our results. However, while differences across parties are smaller for COVID-19 than for climate change, the ranking of parties on the two dimensions are very similar. These findings raise several questions for further research. First, is this difference in polarization across the two issues also found in other countries? In the USA, for example, COVID-19 is a highly politically divisive issue (Milligan, 2020). Second, what explains this difference in politicization found in Norway? Third, what explains the close correspondence in party rankings across the two issues?

We fail to find support for several of our hypotheses regarding effects of socioeconomic variables. It thus appears that support (and the differences in support between the two problems) is explained to a greater extent by individual-specific beliefs about the problems and the measures than by sociodemographic factors. Whereas the hypotheses were based on findings in the literature, it should be added that the results in the literature diverge, and the results regarding socioeconomic variables are highly mixed and therefore appear to be context specific and/or sensitive to survey design.

We conducted our survey in a very unique year and a time where attitudes towards COVID-19 measures were likely still evolving quite rapidly (see for instance the substantial changes in attitudes over a short period of time found in Naumann et al., 2020), and our results might therefore have been sensitive to the specific timing of our survey. Also, trust in institutions is high in Norway compared to other countries, as is support for governmental policies in general. Conducting similar studies at different points in time and in different countries could increase the robustness and generalizability of the results.

We based our outcome variables on two survey items measuring support for a policy that was framed in quite a broad and general manner in order to apply equally across the two different problems. The literature has shown that support tends to be lower for more specific policy suggestions (Leiserowitz, 2006). It would therefore be valuable to explore the level of support for more specifically defined policy proposals. Also, to provide an even cleaner comparison of support for measures targeting different problems, it would be useful to find a setting where the level of experience with previous measures is more equal across the different problems. This could typically be two problems that have not yet been subject to any substantial policy initiatives.

Another potentially interesting question for future research is how effective people believed the travel restrictions were in mitigating the COVID-19 pandemic, and whether the perceived policy effectiveness is likely to spill over to other domains, including climate change. It is likely that the perceived effectiveness will be high, as air travel restrictions have been found to be effective in limiting the spread of novel epidemics, but primarily in *delaying* the spread (which is of high value in itself), and more effective when used in combination with other (local) measures (Lee et al., 2009; Stanhope and Weinstein, 2020).

6. Conclusions

Aviation is an important contributor to anthropogenic forcing of the climate system, and may become relatively more important as other sectors successfully mitigate their emissions and climate impacts. To design effective and politically feasible mitigation strategies for this sector, it is important to have a better understanding of public support for a range of different potential policies, as well as the drivers of support. Previous studies have explored how climate change concern explains support for different policies to reduce the climate impact of aviation, including the role of a large number of explanatory factors. We find that largely the same factors explain support for measures to reduce leisure air travel based on the two different concerns (climate change concern and limiting the spread of COVID-19). We find that the expected effectiveness of the measure in reducing the problem is a very powerful explanatory factor. Support for restrictions also increases with a shorter expected duration of the measure; the perceived threat to self, local community, Norway and the world; the perception that the problem is imminent; knowledge about the problem; trust in information from government and science; and decreases with expected negative consequences for self and the poor. When all these perceptions are controlled for, there is no significant residual difference in support depending on whether the measures address climate change or COVID-19.

Our results thus suggest that relatively coercive measures targeting leisure air travel in order to limit GHG emissions could be supported by a majority of the public if they were perceived as environmentally effective and if the threat from climate change were seen as more imminent.

Our finding that one model can predict support for restrictive measures across two different problems, suggests this model may be applicable also to other policy domains, such as biodiversity, air pollution, as well as other public health issues. It thus opens up the possibility of transferring insights across different policy domains, which can potentially accelerate the development of effective and acceptable policy designs. Further research may shed light on which policy issues can be considered under this model's domain.

CRediT authorship contribution statement

Steffen Kallbekken: Conceptualization, Investigation, Writing - original draft, Writing - review & editing, Project administration, Funding acquisition. **Håkon Sælen:** Formal analysis, Investigation, Writing - original draft, Writing - review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary material

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