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## **Gender and Climate Action**

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*Abstract.* It is well-known that men and women differ in their views regarding the severity of climate change, but do they also differ in their support for climate policy and in undertaking climate action? Previous evidence on this question is inconsistent, but unique survey data from the Swedish Environmental Protection Agency enable us to answer it in the affirmative. Swedish women worry more about climate change and perceive it to be a bigger threat than men do. Furthermore, women report a greater support than men for policies to mitigate climate change through political interventions, and also undertake more voluntary actions to achieve this goal. More generally, the results suggest that women and men differ in their willingness to alter behavior and support policy to help mitigate other large scale crises, such as global pandemics.

Keywords: Climate change; public opinion; gender; environmental beliefs

JEL-codes: H23; O44; Q54; Q58; J16

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# 1. Introduction

Ecofeminism suggests that women are more active than men regarding environmental issues for social, cultural, and biological reasons (Stern et al. 1993). Studies identify gender as a key demographic variable to explain environmentally responsible behavior (Zelezny et al. 2000; Zelezny and Bailey 2006; Erdogan et al. 2012), with the consistent finding that women engage more than men do in pro-environmental behaviors such as recycling and green consumer activities (e.g., Hunter et al. 2004; Pisano and Lubell 2017; Xiao and McCright 2014).<sup>1</sup> In general, women also express stronger pro-environmental beliefs and greater concern about environmental issues than men (e.g., Bord and O'Connor 1997; Davidson and Freudenberg 1996; Stern et al. 1999; Dietz et al. 2002; McCright 2009, 2010; McCright and Xiao 2014; Xiao and McCright 2015).<sup>2</sup> These two robust findings offer considerable support for the argument that gender affects pro-environmental behaviors via mediating factors such as pro-environmental values and attitudes.

The purpose of this study is to examine whether a similar pattern can be found in the context of climate change; that is, whether systematic differences exist between men and women not only in climate change beliefs and support for climate mitigation policies, but also in their individual climate mitigation behavior. Such voluntary behavior is highlighted by scholars and policymakers as an important component to reaching ambitious climate mitigation targets (Vandenbergh and Steinemann 2007; European Commission 2011). Presently, a large body of research shows a small but consistent gender gap in climate change opinions (see, e.g., McCright 2010; McCright et al. 2016a). Notably, women express more concern about global warming risks than do men (see, e.g. Brody et al. 2008; Malka et al. 2009; McCright 2009; McCright et al. 2014). According to McCright et al.'s (2016a) literature survey, gender appears as the third most consistent predictor of climate change concerns, after pro-environmentalism and left-wing political orientation.

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<sup>1</sup> Sex and gender are not the same thing. The World Health Organization (2010) defines the term "sex" as the biological and physiological characteristics that define men and women, whereas "gender" refers to the socially constructed roles, behaviors, activities, and attributes that a given society considers appropriate for men and women. In the survey underlying this study, participants reported their own gender.

<sup>2</sup> It has been posited that such gender differences are due to perceived vulnerability to risk more generally (Bord and O'Connor 1997). Empirical studies show that men are more risk-taking than women (Byrnes et al. 1999) and also generally more overconfident (Barber and O'Dean 2001): Men think that they can predict and handle the future themselves, whereas women are more ready to adapt their strategies and behavior (Brown-Kruse and Hummels 1993; Patt et al. 2009). Relatedly, research shows that men are more optimistic than women on such varied issues as the risks of nuclear war (Gwartney-Gibbs and Lach 1991), online purchases (Garbarino and Strahilevitz 2004), relationship survival (Srivastava et al. 2006), and the economic situation (Jacobsen et al. 2014; Bjuggren and Elert 2019).

To our knowledge, however, our study is unique in assessing whether men and women differ systematically not only in their beliefs about the severity of climate change and in what should be done about it through political interventions, but also in their actual individual voluntary actions. Concern is not the same as willingness to act or actual behavior—and gender may even influence pro-environmental behavior more than it affects attitudes (Zelezny et al. 2000)—but the extant climate change literature has scarcely addressed this subtle yet important difference. In fact, gender as a variable is seldom included “in models explaining support for climate policy and pro-climate behavioral intentions, and its performance in such models is not consistent (McCright 2016a, p. 182).” Moreover, gender is often not the focus of the study in question; rather, the variable is included as a sociodemographic control, without much in the way of theorizing or interpretation of results (see e.g., Leiserowitz 2006; Barker and Bearce 2012).

Furthermore, to our knowledge, no such study to date asks respondents to report actual behavior to mitigate climate change, rather than behavioral intentions. Our data, by contrast, make it possible for us to examine the influence of gender not only on climate beliefs and attitudes, but also on climate actions. To examine whether men and women differ in their views of climate change and in their climate action we employ data from the Swedish Environmental Protection Agency (*Naturvårdsverket*), based on a survey from 2018. Findings from ordered logistic regressions consistently show that Swedish women worry more about climate change, perceive it to be a bigger threat than men do, but also a greater belief that something can be done to mitigate climate change, both by Sweden and by the individual. Moreover, women report greater support for political interventions aimed at reducing climate change, including both taxes, subsidies, and information campaigns. Women also report to a greater extent than men that they take individual actions to mitigate climate change, e.g. through recycling, residential energy savings, reducing meat consumption, and the choice of holiday destination. That said, all actions are self-reported and should therefore be interpreted with care (Kormos and Gifford 2014).<sup>3</sup>

A plausible extension of our results is that women may also be more ready to alter their behavior and promote policies that mitigate other large scale crises. In view of the present pandemic and the increased need for social distancing, the findings that women are more willing to change

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<sup>3</sup> Generally, men have more confidence regarding their ability and performance than women, although such gender differences are most pronounced for tasks deemed to be in the masculine domain (Lundeberg et al. 1994; Barber and O’Dean 2001). Swim et al. (2019) show that while environmentalism in general may be seen as feminine because it fits in with women’s traditional role as caregivers, particular pro-environmental behaviors can align with either traditional feminine or masculine roles.

their of modes of everyday transport as well as their choice of holiday destination are especially worth emphasizing. These findings are in line with previous research demonstrating that women are more prone to follow public health advice than men, such as abstaining from tobacco and alcohol, and washing hands after using a public restroom (Reuters, 2020). Arguably, the results are also relevant for other issues of global concern, with the current corona virus pandemic being an obvious example.

## 2. Background

Women consistently report stronger pro-climate views than men (see, e.g., Leviston and Walker 2012; Kvaløy et al. 2012; McCright 2010). There are reasons to think that there may be a link between climate perceptions and support for climate policy, as well as the degree to which one engages in climate-mitigating behavior, and that this link is modified by gender. Theoretically, perception can be construed as the process by which individuals receive information or stimuli and transform it into psychological awareness, in order to learn about the environment and respond to what is perceived (Bridgeman and Tseng 2011). The theory of planned behavior (TPB; Azjen 1991) stipulates that behavioral achievement depends on both motivation (intention) and ability (behavioral control), and has become a frequently applied model to explain predict the development of environmentally responsible behavior. However, while such studies may include gender as a statistical parameter when applying the TPB model, this variable is seldom included in the theoretical discussion (Sakellari and Skanavis 2013).

Climate change perceptions are essential to document because such perceptions influence adaptation processes and potential measures to adapt to or reduce climate change effects (Maddison 2006). Indeed, some previous studies on climate change perception have been undertaken with the stated intention of exploring mitigation options (Semenza et al. 2008; Debono et al. 2010; Hansen et al. 2012), revealing that more informed respondents are also more ready to act. In addition, scientifically accurate beliefs about climate change have been shown to be a powerful predictor of support for government action to reduce emissions (Bostrom et al. 2012; Bord et al. 2000; Dietz et al. 2007; Krosnick et al. 2006; McCright 2009; O'Connor et al. 1999, 2002; Zahran et al. 2006; McCright et al. 2013).

However, in spite of strong evidence pointing to a gender difference in climate beliefs, less is known about whether a similar link can be found between gender and views on climate action at the political and the individual level, with the studies that exist reporting fairly inconsistent results (McCright 2016a, p. 182). For instance, many studies report insignificant results for

gender's role in support for climate change policy (see e.g. Krosnick et al. 2006; O'Connor et al. 2002), and whereas some studies find women to be more supportive of such policies (see, e.g., Zahran et al. 2006), others report the opposite relationship (see, e.g., Leiserowitz 2007; O'Connor et al. 1999).

Among the studies reviewed by McCright et al. (2016a), 8 out of 16 studies examining the relationship between gender and support for climate change policy report insignificant results, as do 5 out of 7 examining the relationship between gender and pro-climate behavioral intentions. Moreover, only one study (McCright et al. 2016b) examines gender's effect on climate beliefs, support for climate policy, and behavioral intentions at the same time, but does not focus on these relationships. The survey finds that women have greater climate concerns and are more ready to alter behavior than men, but no effect from gender on support for climate change policy.

Two additional studies (O'Connor et al. 1999; 2002) examine genders effect on support for climate policy and behavioral intentions simultaneously, and while neither finds that women are more supportive of climate policy, O'Connor et al. (1999) find a positive effect on behavioral intentions: Women are more likely to report a willingness to take voluntary action to mitigate climate change, but "(o)nce there are controls for views toward the government and climate change, and general environmental beliefs, men and older respondents are actually somewhat more likely to vote for government policies to address climate change than are women and the young. This finding for women is in stark contrast to their disproportionate support for voluntary actions" (O'Connor et al. 1999, p. 468).

In summary, prior empirical evidence presents a less than clear-cut view of the relationship between gender, climate beliefs, and willingness to act to mitigate climate change. Moreover, none of the surveys covered by McCright et al. (2016a) ask respondents to report actual behavior to mitigate climate change, rather than behavioral intentions. This hints at an important omission, since willingness to act is not the same as actual behavior. In view of this dearth of knowledge vis-à-vis a theoretically straightforward link, more in-depth research aimed at furthering our understanding the relationship between gender, climate beliefs, and climate action is necessary.

### 3. The survey

The survey was undertaken in 2018 by *Naturvårdsverket*, Sweden’s environmental protection agency. It asked 994 respondents (463 women and 531 men) about their perceptions about climate and climate action. Questions are categorized depending on whether they relate to A) beliefs about climate change in general, B) the type of political interventions that could potentially be employed to mitigate climate change, and C) which type of voluntary actions that have already been undertaken by the respondent to mitigate climate change. Questions in category A contain statements about climate change and respondents are asked to indicate their level of agreement with each statements on a scale ranging from 1 to 5. Questions in category B suggest a particular intervention, and respondents are asked to indicate if they support the intervention on a scale ranging from 1 to 4. Questions in category C ask if the respondent has taken action to mitigate climate change by undertaking a specific measure. Respondents are asked to indicate to what extent they have done so on a scale ranging from 1 to 5. For a comprehensive description of the survey questions, we refer to Appendix B.

The survey finds that 95 percent of Swedes believe (absolutely or maybe) “that climate change is something which, now or in the future, will affect us who live in Sweden”. These numbers contrast somewhat with a survey from the European Investment Bank (2018), according to which 63 percent of Swedes describe themselves as concerned or alarmed when thinking about climate change, which is below the EU average. 81 percent of respondents in *Naturvårdsverket*’s study think (absolutely or maybe) “that we in Sweden can do something to reduce climate change,” whereas 78 percent of respondents think (absolutely or maybe) that they “personally (can) do something to reduce climate change” (*Naturvårdsverket* 2018).

*Table 1. Descriptive statistics for all variables included in the empirical analysis.*

<b>1a. Demographic variables (n=994)</b>				
Variable	Mean	Std. Dev.	Min	Max
Female	0.47	0.50	0	1
Education	2.38	0.63	1	3
Age	51.02	17.62	18	84
Drives car regularly	0.84	0.36	0	1
Unemployed	0.02	0.15	0	1
Student	0.06	0.24	0	1
Retired	0.29	0.45	0	1
Public sector	0.22	0.41	0	1

Pop>200 K	0.25	0.43	0	1
Pop>15 K	0.68	0.47	0	1

<b>1b. Survey responses by gender</b>	<b>Male (n=531)</b>		<b>Female (n=463)</b>	
<b>A) General questions (see Table 2)</b>	Mean	Std. Dev.	Mean	Std. Dev.
Climate change affects Sweden	4.53	0.88	4.80	0.51
Sweden can reduce climate change	3.88	1.30	4.32	0.96
The individual can reduce climate change	3.80	1.31	4.29	0.99
<b>B) Climate policy questions (see Tables 3, 4)</b>				
Tax bad goods	2.17	1.27	2.34	1.25
Subsidize good goods	2.87	1.14	3.11	1.04
Send information	3.30	0.86	3.49	0.76
<b>C) Individual climate actions (see Tables 5, 6)</b>				
Recycling	4.31	1.07	4.58	0.84
Energy saving	3.76	1.22	3.91	1.18
Reusing	3.96	1.13	4.26	0.98
Transport	3.30	1.44	3.51	1.43
Meat reduction	2.78	1.44	3.51	1.45
Holiday destination	2.79	1.39	3.18	1.46

The share of women responding in the affirmative to these questions is higher than the share of men (as can be seen from the mean differences in Table 1b). This hints at a gender difference in climate change perception in Sweden, which other studies confirm, see e.g., the European Investment Bank (2018).<sup>4</sup> Whether this effect persists when other background variables are taken into account is an open question.

## 4. Empirical analysis

### 4.1 Beliefs about climate change in general

Table 2 shows results from ordered logistic regressions where the outcomes for the three general climate change questions are regressed on: (1) The female dummy alone, and then (2): The female dummy together with the other background covariates: education, age, drives car, a set of dummies for occupational status, and dummies for the city size.<sup>5</sup> For all three questions, the odds ratio for the female dummy is larger in magnitude in (1) but retains the same high level

<sup>4</sup> The EiB survey shows that 74 percent of Swedish women are alarmed or concerned about climate change, compared to a mere 52 percent of men. Moreover, more women than men engage in a number of climate mitigating actions such as recycling, buying local and seasonal food, and reducing the amount of waste.

<sup>5</sup> Corresponding versions of tables 2, 3, and 5 using OLS are available in the appendix.



of significance in the encompassing models (2). The conditional estimated odds ratio regarding whether climate change affects Sweden is 2.1. The interpretation is that being a female is associated with a 2.1 increase in the odds of reporting a level of agreement that is one level higher than a man with identical the background characteristics. Furthermore, being a female is associated with a 1.6 increase in the odds of believing that Sweden can help reduce climate change, and 1.8 higher odds of believing that the individual can reduce climate change. None of the other variables are precisely estimated, with the exception of education, which increases the odds ratio that respondents will agree that climate change affects Sweden.

These findings suggest that there is a gender effect both in perceptions about climate change and in what can be done about climate change, even when other covariates are taken into account. Moreover, the magnitude of this effect is fairly large. A potential interpretation is that women, when faced with a societal crisis or a global threat, are more prone than men to support policy actions and to alter their own behavior. Given the challenges presently posed by the novel coronavirus, a better understanding of such differences and how they manifest are essential.

*Table 2. General climate change questions. Results from ordered logistic regressions.*

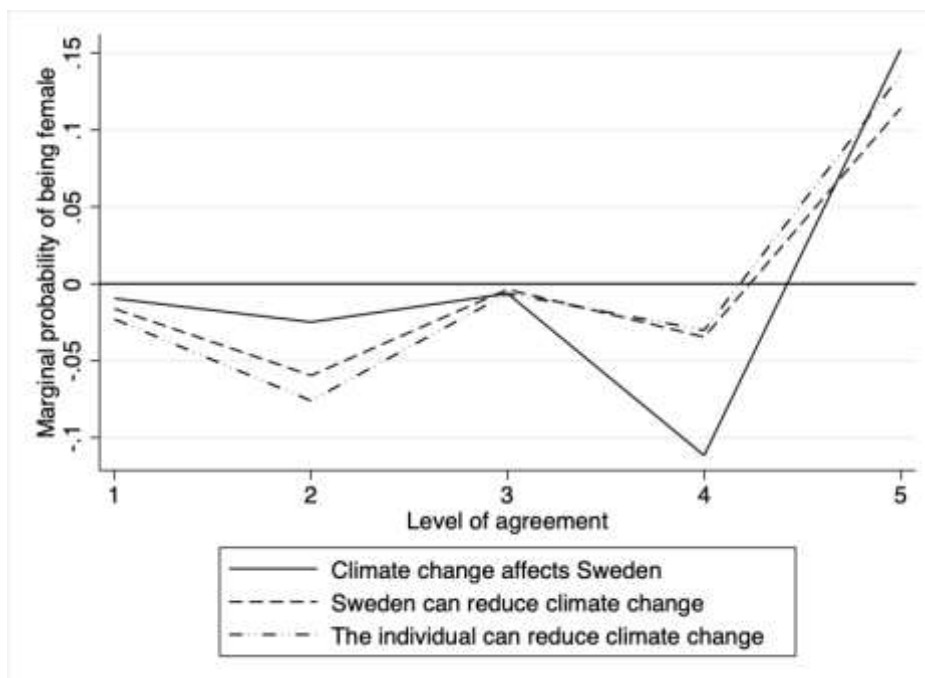
	Climate change affects Sweden		Sweden can reduce climate change		The individual can reduce climate change.	
	(1)	(2)	(1)	(2)	(1)	(2)
Female	2.355*** (5.57)	2.082*** (4.50)	1.800*** (4.93)	1.591*** (3.72)	1.982*** (5.76)	1.763*** (4.51)
Education		1.480*** (3.30)		1.277* (2.49)		1.201 (1.91)
Age		0.989 (-1.55)		0.987* (-2.28)		0.988* (-2.00)
Drives car		0.542* (-2.26)		0.809 (-1.14)		0.856 (-0.89)
Unemployed		1.845 (0.94)		1.303 (0.49)		1.424 (0.72)
Student		1.386 (0.77)		1.508 (1.35)		0.875 (-0.47)
Retired		1.283 (0.96)		1.479 (1.84)		1.025 (0.11)
Public sector		1.060 (0.27)		1.221 (1.21)		1.192 (0.98)
Pop>200 K		0.864		1.450*		1.412*

		(-0.73)		(2.31)		(2.18)
Pop>15 K		1.094		0.833		0.832
		(0.52)		(-1.29)		(-1.31)
<i>N</i>	994	994	994	994	994	994

*t* statistics in parentheses \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

To better understand this result, we first compute the probability associated with each response-level, evaluated for a hypothetical male respondent (Female=0) where each of the remaining control variables are set to their respective means. Since our sample is chosen to be representative for the adult Swedish population, these probabilities are illustrative for a typical Swedish male. We then compute the marginal change in the probability of choosing each response-level when instead evaluating the same probabilities for a typical female. These marginal probabilities are plotted in Figure 1 for each question in category A. We see that the probability of choosing the highest level of agreement to the three statements is 0.1-0.15 higher for a typical female than a typical male. It is interesting to note that for all three questions, the gender difference is most pronounced at the highest response levels. Notably, a typical female is actually *less* likely than a male to choose the second highest level of agreement.

Figure 1. General Climate Questions: Marginal probabilities



## 4.2 Climate policy questions

As documented above, women are more optimistic about the possibility to mitigate climate change in general, suggesting that women should have a more favorable view of public climate policies. The survey delves deeper into this issue by asking respondents their views of “the state adding new taxes and fees to goods and services such as petrol, oil, and flights that have major climate impact” (labeled *Tax bad goods* in Table 3), “the state using tax funds to provide grants or lower taxes when purchasing goods and services which reduce climate-affecting emissions” (*Subsidize good goods*), and “sending more information to households about climate change, in order to make them choose goods and services which reduce climate-affecting emissions” (*Send information*). On average, women respond more in the affirmative to these questions than men do (see Table 1b).

Table 3 shows results from ordered logistic regressions where the results for the climate policy questions are regressed (1) against the gender dummy in isolation, then (2) against the gender dummy together with the other background variables. While women on average seem somewhat more positive to new environmental taxes, the difference becomes insignificant when other variables are included. A similar phenomenon transpires for environmental subsidies, although the difference remains significant at the 5 percent level. By contrast, women are more positive to information even when controlling for other variables: The estimated odds ratios indicate that women have 1.4 higher odds than men of being in favor of subsidizing goods, and 1.8 higher odds of being in favor of more climate change information.

*Table 3. Climate policy questions. Results from ordered logistic regressions.*

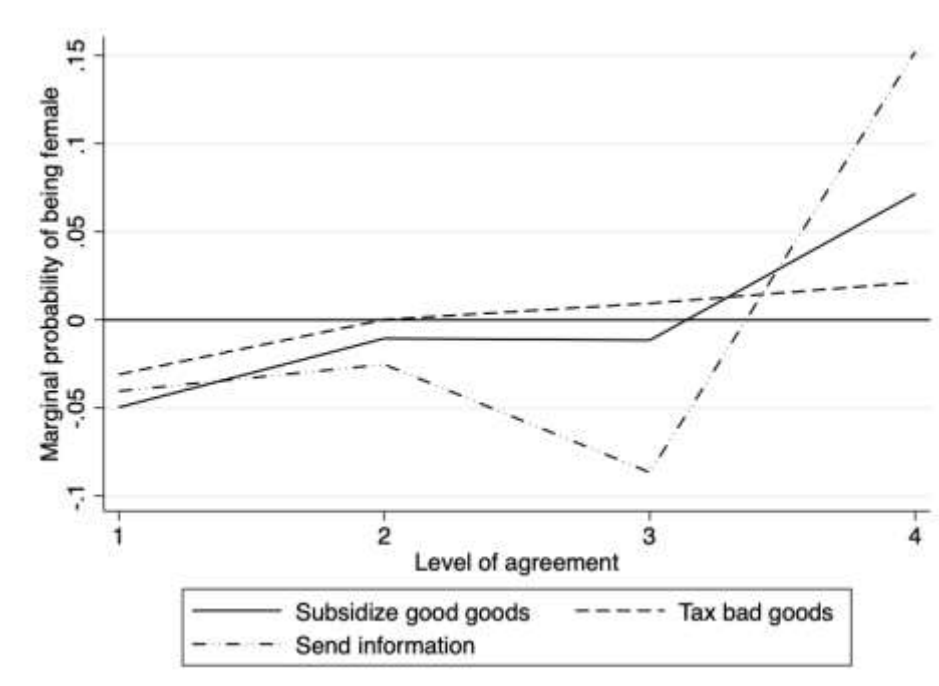
	Tax bad goods		Subsidize good goods		Send information	
	(1)	(2)	(1)	(2)	(1)	(2)
Female	1.292*	1.132	1.505***	1.359*	1.661***	1.842***
	(2.18)	(1.00)	(3.47)	(2.48)	(4.03)	(4.44)
Education		1.237*		0.959		0.833
		(2.11)		(-0.43)		(-1.79)
Age		0.996		0.990		1.011
		(-0.72)		(-1.70)		(1.84)
Drives car		0.485***		0.746		1.339
		(-4.31)		(-1.73)		(1.53)
Unemployed		0.923		0.946		1.294
		(-0.16)		(-0.18)		(0.54)
Student		1.200		0.954		0.685

		(0.61)		(-0.16)		(-1.22)
Retired		1.027		0.950		1.052
		(0.13)		(-0.26)		(0.22)
Public sector		1.241		1.278		1.159
		(1.31)		(1.49)		(0.84)
Pop>200 K		1.585**		1.065		1.235
		(2.98)		(0.41)		(1.22)
Pop>15 K		0.988		0.789		1.027
		(-0.09)		(-1.71)		(0.18)
<i>N</i>	994	994	994	994	994	994

*t* statistics in parentheses \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

In all, Table 3 points to the existence of a considerable gender effect with regards to willingness to see political climate action, with women advocating stronger measures. To better understand these results, we again plot marginal probabilities comparing the response of a typical male to the response of a typical female for each question in category B, as shown in Figure 2. Again, we see that the probability of choosing the highest level of agreement to the three statements is higher for a typical female than a typical male, with the clearest difference occurring for the information question. Further, a typical female is *less* likely than a male to choose the second highest level of agreement for all policies except for taxing bad goods.

Figure 2. Climate Policy Questions: Marginal probabilities



It is also valuable to assess whether there is a difference in the relative support for a particular type of intervention. For example, if women would support subsidies relative to taxes to a greater extent than men, one could argue such view to be “naïve” in the sense that it did not consider that subsidies have to somehow be financed through taxes. Further, if the relative support for information campaigns would be greater for women, it could reflect the fact that women tend to follow the advice communicated by public authorities to a greater extent than men, and that women therefore believe that information campaigns are relatively more effective.

To examine the relative support for each intervention, we first express each respondent’s score as a percentage of the sum of the scores associated with all interventions. For example, if one respondent gives scores of 1, 2, and 4, to tax, subsidy, and information respectively, the percentage “normalized” subsidy score of that individual is  $100 \cdot (2 / (1 + 2 + 4)) = 28.5$  percent. We then regress these normalized scores on the gender dummy and the background variables.

Results from OLS regressions are shown in Table 4. The gender dummy is not statistically significant in any of the three specifications. In other words, women and men value the relative support for the three interventions approximately equally.

*Table 4. Relative willingness of interventions. Results from OLS.*

	Tax bad goods		Subsidize good goods		Send information	
	(1)	(2)	(1)	(2)	(1)	(2)
Female	-0.683 (-1.01)	0.361 (0.52)	0.560 (0.92)	0.313 (0.50)	0.123 (0.18)	-0.675 (-0.99)
Education		-0.899 (-1.75)		-0.892 (-1.89)		1.792*** (3.44)
Age		0.0695* (2.21)		-0.0484 (-1.71)		-0.0211 (-0.67)
Drives car		4.607*** (5.29)		-0.410 (-0.53)		-4.197*** (-4.33)
Unemployed		-0.271 (-0.12)		2.083 (0.87)		-1.812 (-0.79)
Student		-1.312 (-0.88)		-0.393 (-0.31)		1.705 (1.09)
Retired		0.872 (0.74)		-0.895 (-0.84)		0.0237 (0.02)

Public sector		-0.681 (-0.77)		0.201 (0.25)		0.480 (0.52)
Pop>200 K		-1.975* (-2.37)		-0.728 (-0.95)		2.703** (3.19)
Pop>15 K		1.513 (1.90)		-1.626* (-2.27)		0.114 (0.15)
Constant	41.02*** (84.50)	34.70*** (17.10)	33.90*** (78.14)	40.44*** (22.41)	25.08*** (53.82)	24.86*** (11.76)
<i>N</i>	994	994	994	994	994	994

*t* statistics in parentheses \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

### 4.3 Individual climate actions

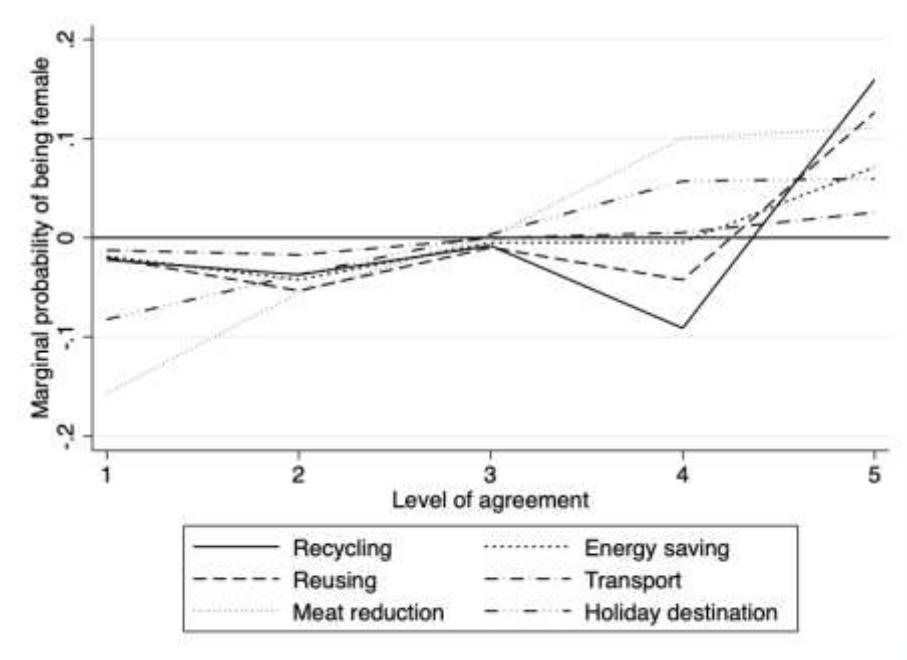
As to specific actions by individuals to mitigate climate change and its effects, the survey examines a number of such behavioral measures. Specifically, it asks respondents: “Have you done something in your everyday life to reduce your climate impact in the last two years, for example...”, listing as possible options “recycling,” “energy saving,” “reusing,” “transport choice,” “meat reduction,” and “holiday destination choice,” with women reporting higher levels of adherence for all six measures (see Table 1b).

In Table 5, we regress these responses using ordered logistic regressions (1) against the gender dummy in isolation, and (2) against the gender dummy together with the same set of background variables as before. Overall, results corroborate the idea from Table 2 that women are more willing to alter their behavior. A possible exception is the choice of transport, where the difference is comparatively small and insignificant after controlling for the background variables. Notably, respondents that drive regularly also report that they have changed their choice of transport to a greater extent. Since women drive less than men (80 percent of women compared to 88 percent of the men report to drive a car regularly), this partly explains why the coefficient becomes insignificant after adding the background variables. However, when excluding the background variables, the effect is precisely estimated. Overall, the results confirm the persistence of a gender effect in climate action. Notably, the odds ratios for the gender dummy with regard to recycling and energy saving become larger and more significant when other covariates are taken into account, suggesting that the actual gender effect is obfuscated by other characteristics of individuals in these cases.

The estimated odds ratios indicate that women have 1.9 higher odds than men of recycling, 1.4 higher odds of engaging in energy saving, 1.7 higher odds of reusing, 2.4 higher odds of engaging in meat reduction, and 1.6 higher odds of changing their holiday destination. As discussed in the introduction, one interpretation is that women, when faced with a crisis, are more prone than men to alter their own behavior in a variety of ways in order to mitigate the challenge in question.

In all, Table 5 points to the existence of a considerable gender effect with regards to the individual’s climate actions. To better understand these results, we plot marginal probabilities comparing the response of a typical male to the response of a typical female for each question in category C, as shown in Figure 3. For each statement, we see that the probability of choosing the highest level of agreement is higher for a typical female than a typical male. Moreover, only for reusing and recycling is a typical female considerably *less* likely than a male to choose the second highest level of agreement.

Figure 3. Individual Climate Actions: Marginal Probabilities



Moreover, it is important to assess whether there is a difference in the relative willingness to engage in a particular type of intervention. To examine this, we first express each respondent score as a percentage of the sum of the scores associated with all interventions. We then regress these variables on the gender dummy and the background variables.

Table 5. Individual actions. Results from ordered logistic regressions.

	Recycling		Energy saving		Reusing		Transport		Meat reduction		Holiday destination	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Female	1.781***	1.923***	1.281*	1.412**	1.744***	1.720***	1.305*	1.135	2.435***	2.351***	1.631***	1.618***
	(4.36)	(4.68)	(2.10)	(2.73)	(4.60)	(4.32)	(2.31)	(1.00)	(7.43)	(6.62)	(4.22)	(3.82)
Education		0.872		1.003		0.952		1.033		1.160		0.818*
		(-1.20)		(0.03)		(-0.50)		(0.35)		(1.62)		(-2.06)
Age		1.013*		1.002		1.001		0.996		0.995		1.000
		(2.00)		(0.39)		(0.12)		(-0.63)		(-0.93)		(0.05)
Drives car		0.983		1.560*		0.953		0.447***		0.801		0.772
		(-0.09)		(2.33)		(-0.27)		(-4.20)		(-1.28)		(-1.52)
Unemployed		1.000		1.779		1.156		1.018		1.615		2.222
		(0.00)		(1.56)		(0.40)		(0.05)		(1.05)		(1.75)
Student		1.092		0.928		0.998		2.113*		1.315		1.055
		(0.27)		(-0.25)		(-0.01)		(2.54)		(0.94)		(0.21)
Retired		1.375		1.469		1.185		1.371		1.264		1.255
		(1.28)		(1.88)		(0.79)		(1.55)		(1.17)		(1.06)
Public sector		1.344		1.011		1.272		1.257		0.877		1.186
		(1.69)		(0.06)		(1.40)		(1.35)		(-0.84)		(1.06)
Pop>200 K		0.966		1.282		1.438*		1.602**		1.713***		1.341*
		(-0.19)		(1.59)		(2.21)		(2.97)		(3.78)		(2.05)
Pop>15 K		0.792		0.601***		0.633**		1.100		0.978		0.627***
		(-1.49)		(-3.63)		(-3.19)		(0.72)		(-0.16)		(-3.39)
N	994	994	994	994	994	994	994	994	994	994	994	994

t statistics in parentheses \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$



Table 6. Relative willingness of individual actions. Results from OLS.

	Recycling		Energy saving		Reusing		Transport		Meat reduction		Holiday destination	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Female	-0.626	-0.481	-1.101***	-0.778*	-0.298	-0.205	-0.450	-0.812*	1.977***	1.808***	0.498	0.467
	(-1.92)	(-1.39)	(-3.66)	(-2.53)	(-1.01)	(-0.66)	(-1.42)	(-2.57)	(5.93)	(5.34)	(1.52)	(1.38)
Education		-0.0581		0.0217		-0.128		0.149		0.698**		-0.683*
		(-0.22)		(0.09)		(-0.52)		(0.61)		(2.64)		(-2.58)
Age		0.0317*		0.00759		0.00459		-0.0187		-0.0178		-0.00738
		(1.97)		(0.54)		(0.33)		(-1.26)		(-1.15)		(-0.44)
Drives car		0.302		2.243***		0.359		-2.093***		-0.355		-0.455
		(0.60)		(5.90)		(0.93)		(-4.68)		(-0.76)		(-0.98)
Unemployed		-1.322		0.575		-0.0259		-0.696		0.394		1.074
		(-1.54)		(0.66)		(-0.02)		(-0.74)		(0.38)		(1.09)
Student		-0.222		-0.934		-1.191		1.703**		0.766		-0.122
		(-0.27)		(-1.47)		(-1.93)		(2.85)		(1.05)		(-0.16)
Retired		-0.603		0.193		-0.561		0.639		0.175		0.158
		(-1.01)		(0.36)		(-1.07)		(1.19)		(0.30)		(0.27)
Public sector		0.429		-0.468		-0.0710		0.425		-0.525		0.209
		(0.94)		(-1.12)		(-0.18)		(0.93)		(-1.17)		(0.47)
Pop>200 K		-1.660***		-0.141		-0.536		0.752		1.268**		0.317
		(-3.87)		(-0.37)		(-1.38)		(1.90)		(2.99)		(0.77)
Pop>15 K		0.421		-0.900*		-0.0742		0.931*		0.577		-0.955*
		(1.10)		(-2.55)		(-0.21)		(2.51)		(1.48)		(-2.39)
_cons	23.48***	20.40***	18.77***	15.58***	20.23***	21.41***	14.78***	17.34***	11.37***	10.18***	11.38***	15.10***
	(50.95)	(10.08)	(53.46)	(11.00)	(50.63)	(13.42)	(45.44)	(11.63)	(33.45)	(6.38)	(30.78)	(7.65)
N	898	898	898	898	898	898	898	898	898	898	898	898

*t* statistics in parentheses \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Results from OLS regressions are shown in Table 6. The gender dummy is highly statistically significant and positive for meat reduction, suggesting that women are relatively more willing to eat less meat compared to the other measures. The opposite holds for energy savings and transport (although these coefficients are only significant at the 5 percent level). A likely reason is that men own about twice as many cars and residential properties in Sweden as women (Ownershift 2019), suggesting that men have a greater potential to take measures in these two areas.

## 5. Summary and conclusions

Previous evidence regarding men's and women's readiness to support and undertake climate action is inconsistent. Using unique survey data from the Swedish Environmental Protection Agency where respondents are asked about their views and behavioral intentions, as well as their actual behavior, we are able to identify a pronounced and consistent gender gap vis-à-vis climate views, intentions, and behavior. Swedish women not only worry more about climate change and perceive it to be a bigger threat than men do; they also report a greater willingness than men to support climate policies, and that they engage more in voluntary actions that mitigate climate change.

One limitation of our study is that all actions are self-reported; as such, they should be interpreted with care (Kormos and Gifford 2014). Generally, men have more confidence regarding their ability and performance than women, although such gender differences are most pronounced for tasks deemed to be in the masculine domain (Lundeberg et al. 1994; Barber and O'Dean 2001). Swim et al. (2019) show that while environmentalism in general may be seen as feminine because it fits in with women's traditional role as caregivers, particular pro-environmental behaviors can align with either traditional feminine or masculine roles. While it is important to delve deeper into how such gender stereotypes, future studies should also examine how men's and women's willingness to alter mitigation behavior is affected by the costs of doing so (cf. Diederich and Goeschl 2017), and whether adverse consequences in terms of a behavioral rebound effect differ by gender (cf. Dorner 2019).

More generally, the results from our study suggest that women and men may differ in their readiness to alter behavior and support policy to help mitigate other large scale crises, such as the present global pandemic. In view of the challenge the world is currently facing from the novel corona virus, an appreciation of this readiness can have ramifications beyond climate

change. For example, they may help explain why men are more prone to catch and die from the virus than women. As a case in point, a Swedish survey from April 2020 suggests that women to a greater extent than men adhere to Swedish authorities' behavioral suggestions regarding the virus (Kantar Sifo 2020). The same study shows that men are more prone than women to believe that efforts to mitigate the spread of the virus do not take the state of the economy into sufficient consideration. Future studies should probe deeper into the reasons for such differences, with the explicit goal of developing better mitigation policies against climate change and other global threats.

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## Appendix A: Complementary tables

Table 2. General climate change questions. Results from OLS.

	Climate change affects Sweden		Sweden can reduce climate change		The individual can reduce climate change.	
	(1)	(2)	(1)	(2)	(1)	(2)
Female	0.216*** (6.11)	0.189*** (5.07)	0.305*** (5.90)	0.252*** (4.74)	0.336*** (6.39)	0.288*** (5.18)
Education		0.0976** (3.24)		0.0854* (2.01)		0.0470 (1.08)
Age		-0.00196 (-1.15)		-0.00522* (-2.19)		-0.00451 (-1.78)
Drives car		-0.0861 (-1.81)		-0.116 (-1.67)		-0.0770 (-1.09)
Unemployed		0.120 (1.13)		0.0694 (0.34)		0.150 (0.76)
Student		0.0912 (1.28)		0.219* (2.07)		-0.00188 (-0.02)
Retired		0.0782 (1.16)		0.191* (2.08)		0.0180 (0.19)
Public sector		0.0180 (0.35)		0.0920 (1.31)		0.0764 (1.01)
Pop>200 K		-0.00469 (-0.10)		0.169* (2.57)		0.186** (2.78)
Pop>15 K		0.0179 (0.41)		-0.0821 (-1.33)		-0.0957 (-1.51)
Constant	3.608*** (124.13)	3.515*** (26.41)	3.142*** (79.52)	3.250*** (19.47)	3.082*** (77.03)	3.281*** (18.75)
<i>N</i>	986	986	982	982	976	976

*t* statistics in parentheses \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table 3. Climate policy questions. Results from OLS.

	Tax bad goods		Subsidize good goods		Send information	
	(1)	(2)	(1)	(2)	(1)	(2)
Female	0.111* (2.03)	0.0416 (0.75)	0.203*** (4.13)	0.161** (3.16)	0.185*** (4.75)	0.209*** (5.10)
Education		0.0793 (1.82)		-0.0509 (-1.27)		-0.0661* (-2.15)
Age		-0.00122 (-0.47)		-0.00443* (-1.99)		0.00400* (2.14)
Drives car		-0.354*** (-4.34)		-0.131 (-1.93)		0.0829 (1.40)
Unemployed		0.0259 (0.12)		0.0530 (0.39)		0.0243 (0.17)
Student		0.122 (0.89)		0.0393 (0.34)		-0.0309 (-0.31)
Retired		-0.0146 (-0.16)		0.00548 (0.07)		0.0103 (0.15)
Public sector		0.0991 (1.32)		0.0948 (1.45)		0.0441 (0.81)
Pop>200 K		0.224** (3.16)		0.0277 (0.44)		0.0689 (1.33)
Pop>15 K		-0.0123 (-0.20)		-0.119* (-2.08)		0.0113 (0.25)

Constant	1.711*** (46.25)	1.843*** (10.53)	2.144*** (62.53)	2.671*** (17.66)	2.422*** (86.54)	2.258*** (18.07)
<i>N</i>	929	929	935	935	952	952

*t* statistics in parentheses \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table 5. Behavioral intentions questions. Results from OLS.

	Recycling		Energy saving		Reusing		Transport		Meat reduction		Holiday destination	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Female	0.203*** (4.44)	0.215*** (4.54)	0.121* (2.22)	0.147** (2.60)	0.236*** (4.79)	0.224*** (4.46)	0.145* (2.24)	0.0808 (1.21)	0.494*** (7.55)	0.461*** (6.75)	0.277*** (4.18)	0.260*** (3.76)
Education		-0.0668 (-1.78)		-0.0274 (-0.61)		-0.0554 (-1.36)		-0.0123 (-0.24)		0.0849 (1.60)		-0.109 (-1.95)
Age		0.00348 (1.47)		-0.000130 (-0.05)		-0.000598 (-0.25)		-0.00305 (-1.00)		-0.00370 (-1.20)		-0.000356 (-0.11)
Drives car		-0.0156 (-0.23)		0.190* (2.21)		-0.0502 (-0.69)		-0.394*** (-4.20)		-0.109 (-1.15)		-0.160 (-1.63)
Unemployed		0.0106 (0.07)		0.286 (1.90)		0.0573 (0.41)		0.0643 (0.31)		0.286 (1.25)		0.419 (1.69)
Student		0.101 (0.82)		0.0332 (0.22)		0.0680 (0.52)		0.387** (2.64)		0.212 (1.33)		0.0595 (0.36)
Retired		0.105 (1.22)		0.196* (2.16)		0.0917 (1.06)		0.202 (1.84)		0.154 (1.38)		0.138 (1.17)
Public sector		0.107 (1.71)		-0.00736 (-0.10)		0.0778 (1.13)		0.100 (1.12)		-0.0679 (-0.77)		0.104 (1.15)
Pop>200 K		-0.0103 (-0.16)		0.112 (1.54)		0.147* (2.19)		0.267** (3.24)		0.308*** (3.80)		0.174* (2.09)
Pop>15 K		-0.0811 (-1.55)		-0.223*** (-3.61)		-0.188** (-3.25)		0.0411 (0.56)		-0.0227 (-0.29)		-0.288*** (-3.66)
Constant	2.447*** (71.20)	2.432*** (15.74)	2.015*** (54.25)	1.972*** (10.88)	2.160*** (61.22)	2.412*** (15.18)	1.728*** (39.78)	2.077*** (10.46)	1.349*** (30.94)	1.333*** (6.26)	1.352*** (31.21)	1.851*** (8.76)
<i>N</i>	981	981	968	968	970	970	973	973	978	978	940	940

*t* statistics in parentheses \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

## Appendix B: Survey questions

Not all questions in the original survey are analyzed in the current paper, e.g., questions relating to areas such as health care and integration. For a description of the full survey, we refer to Naturvårdsverket (2018). Below is a description of the questions examined in the current paper.

### *Question in category A*

1. "Do you think that the climate change is something which, now or in the future, will affect us who live in Sweden?"
2. "Do you think that we in Sweden can do something to reduce climate change?"
3. "Do you think that you can personally do something to reduce climate change?"

Respondents were asked to indicate their level of agreement, which we code in increasing order:

1. No, not at all
2. No, hardly
3. Don't know
4. Yes, possibly
5. Yes, absolutely

### *Questions in category B*

1. "What do you think about the state adding new taxes and fees to goods and services such as petrol, oil, and flights that have major climate impact?"
2. "What do you think about the state using tax funds to provide grants or lower taxes when purchasing goods and services which reduce climate-affecting emissions?"
3. "What do you think about sending more information to households about climate change, in order to make them choose goods and services which reduce climate-affecting emissions?"

Respondents were asked to indicate their assessment of each suggestion, which we code in increasing order:

1. Not good
2. Don't know
3. Fairly good
4. Good

*Questions in category C*

“Have you done something in your everyday life to reduce your climate impact in the last two years, for example...”

1. “... sorting your waste more?”
2. “... reducing your energy use in the home?”
3. “... reusing things?”
4. “... changing your choice of holiday destination?”
5. “... eating less meat?”
6. “... changing your choice of daily transport?”

Respondents were asked to indicate to what extent they had undertaken each action, which we code in increasing order:

1. No, not at all
2. No, hardly
3. Don't know
4. Yes, possibly
5. Yes, absolutely