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Who cares about the climate?
Psychological predictors of political environmentalism among German citizens

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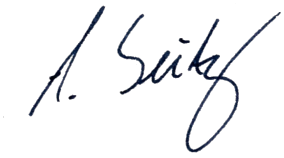

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Introduction

Climate change is arguably the most important political challenge facing governments in the twenty-first century. To minimize the threat posed by it, human CO_2 emissions must be reduced to net zero around 2050 (IPCC 2018, 12; 2021, 16). This goal of carbon neutrality can only be reached through ambitious and economically significant policy measures, which are often politically divisive. In democracies, citizens decide, directly or indirectly, whether and when such climate policies are adopted. Thus, the attitudes of these citizens towards climate protection and individual policy projects such as carbon taxation are essential to the global fight against climate change. Examples such as the "yellow vests" protest wave in France show that while many citizens may agree with the general problem statement, significant measures such as taxation of greenhouse gas emissions are not guaranteed to enjoy widespread support.

Previous works addressing individual-level attitudes towards climate change and environmental policies have focused on the influence of socio-demographic factors, perception of the risks and fairness of specific policies, as well as the relationship between general political orientations (political trust, ideological leanings, party orientation) and various expressions of political environmentalism (cf. Patchen 2006; Drews and van den Bergh 2016; Dalton 2009; Dunlap, Xiao, and McCright 2001; Colvin and Jotzo 2021). With the additional urgency that the climate issue has received in the recent past, it seems relevant to investigate other potential sources of variance. One such source might be an inherent effect of different individual personalities.

In psychology, it has become widely accepted that personality traits can be structured into five basic factors, often referred to as the "Big Five" (Goldberg 1990; McCrae and Costa 1987, 2003). These factors have already been shown to predict individual-level environmentalism or environmentally-significant behaviours (cf. Hirsh 2010; Milfont and Sibley 2012). This paper investigates a potential connection between personality as conceptualized by the Big Five model and political environmentalism, which includes an individual's support for ambitious political measures against climate change, and their tendency to prioritize environmental over economic concerns in the political sphere. First, I review previous findings in the fields of trait psychology, political psychology,

and political sociology about the determinants of political environmentalism and the relationship between the Big Five and political attitudes, as well as environmentalism and environmentally significant behaviours. Based on this literature review, I formulate and test a set of hypotheses regarding the influence of the individual personality traits on four dependent variables: One general measure of the degree to which individuals prioritize climate protection over economic concerns, and three measures of support for specific climate-related policies (A tax on CO_2 emissions, a ban on new registration of combustion engine cars after 2030, and the continued use of nuclear power as an energy source). In addition to the Big Five model, I include an additional sixth trait construct, measuring an individual's tendency to embrace or eschew risk.

The paper contributes to the psychological findings on the antecedents of environmentalist attitudes and environmentally significant behavior by adding an explicitly political dimension (support for far-reaching policies, rather than micro-level behaviors of private citizens). In the field of political science, it adds to a growing body of research regarding the influence of citizens' personality traits on their political attitudes, values, and behaviours. Practically, insights into the personality traits of political environmentalists or anti-environmentalists may help policy makers better understand how to successfully communicate effective climate policies to voters and gain support for such endeavors.

1 Literature review

1.1 Public support for climate policies

It is universally accepted almost as a truism that "public opinion is a key determinant of policy change in democratic countries" (Drews and van den Bergh 2016, 2). Consequently, the questions of how individual citizens, who together constitute 'the public,' form opinions on political issues, and how those opinions then affect political practice, constitute some of the most-studied sub-fields of political science.

One attempt at a comprehensive model explaining "public attitudes and behavior about climate change" was made by Patchen (2006). Patchen considers environmentally relevant behavior (which includes the public expression of policy-related attitudes) to be immediately determined by a person's "emotions about the conditions of the environment,"

along with a cost-benefit analysis and the person's sense of ability or self-efficacy (Patchen 2006, 4). According to Patchen, these intermediary variables are themselves caused by a set of underlying determinants, which he divides into two broad categories: "social influences" and "personal characteristics" (Ibid.). Social influences include demographic characteristics such as age, gender, social class, and religious background, as well as exogenous causes such as the influence of media exposure, social norms and opportunities for action (30–36). Among the personal characteristics Patchen considers knowledge about the issue, values and ideology, and the type of social relationships valued by a person. In between the underlying and the immediate determinants, Patchen locates the individual's "appraisal of the situation," its seriousness, potential solutions, and assignment of responsibility (8–20).

For each of the underlying determinants, Patchen cites a number of academic studies investigating their particular effects on environmentally significant attitudes and behaviors, both political and private. Among the results for the personal characteristics, he finds that better knowledge about climate change and its causes and consequences is related to a greater likelihood to support "hypothetical referenda" about political countermeasures (24). Regarding values, he finds that individuals who place greater importance on biospheric outcomes and societal welfare rather than personal welfare are more likely to engage in environmentally significant behaviors themselves and to support political solution attempts (25–27). Adopting Ronald Inglehart's terminology of post-materialist value change (cf. Inglehart and Flanagan 1987), Patchen concludes that both materialist and non-materialist value systems can positively influence environmental attitudes, including support for costly policies, depending on the scope of the political projects and the framing of the problem. In contrast, Inglehart himself finds that post-materialists are more likely to support environmental protection and to vote for environmentalist parties, and that this relationship is strongest in western democracies, where post-materialist values are the most widespread (Inglehart 1995). In addition to the aforementioned dimensions, Patchen finds that individuals who place more value on long-term outcomes, are less utilitarian, and place less importance on conventional authority and private entrepreneurism all exhibit a stronger tendency towards politically environmentalist views (Patchen 2006, 27–30).

Regarding socio-demographic predictors, women are found to be more environmentalist than men in general, which Patchen explains through gender variance in altruism,

utilitarianism, and risk tolerance, but he also cites some evidence that men are more politically environmentalist and have a stronger tendency to support addressing climate change through public policy (30). Patchen also arrives at the "suprising" (31) conclusion that older people tend to engage in more environmentally positive behaviors, but he does not make clear whether this is also true for political attitudes, specifically. With regard to social class, Patchen identifies a clear positive relationship between a higher level of formal education and environmentalist behaviors, while the effect of higher income is less clear and more reliant on other factors, such as gender or left-right orientation (32).

Drews and van den Bergh (2016) offer another overview of the state of research ten years after Patchen's publication. In their cross-disciplinary review of 95 scientific articles, they focus mostly on personal orientations and values, public and individual perception of specific policies, and "contextual factors of policy support, such as social trust, norms and participation, economic and political aspects, geography and weather, media coverage, and framing," while completely bracketing socio-demographic characteristics (Drews and van den Bergh 2016, 2). Among their main conclusions, they find that a more left-wing political orientation, as well as egalitarian and self-transcending rather than self-enhancing, hierarchical value systems contribute to a higher level of support for climate policies. Like Patchen, they find "key beliefs" (14) about the existence, anthropogenicity, and harmful impact of climate change, which stem from "objectively assessed knowledge," to be among the key predictors of policy support. They also agree with Patchen that a higher level of emotion (e.g. worry, fear) about climate change is related to a higher level of environmentalism. In the context of a specific policy, individuals' perceptions of its effectiveness and fairness play an important role, and policies that are perceived as coercive or expensive are less likely to garner support. Finally, context conditions including political trust, economic situation, geographic vulnerability, and the influence of the media are found to be relevant, "although the evidence covered here is mixed" (Ibid.).

Some recent papers have focused on specific, prominent or controversial climate policies, most often a carbon dioxide tax. In a survey conducted in France, Douenne and Fabre (2020) find that such a measure draws more support from younger people, which appears intuitive considering the mass movements of climate activism among younger people, such as Fridays for Future, and relativizes Patchen's claim that older people are more

environmentalist, at least in the more specific context of divisive climate policies. Further, Douenne and Fabre confirm the importance of left-right orientation, finding that the carbon tax enjoyed support from both centrist and left-leaning respondents, while those leaning to the right tend to reject it (Douenne and Fabre 2020, 10). Maestre-Andrés, Drews, and Bergh (2019) have investigated the role of policy design, with progressive cost distribution and clearly directed use of revenue acting positively. In contrast, Van Boven, Ehret, and Sherman (2018) find that in the US, support for climate policies, including carbon taxation, depends strongly on the partisan affiliation of the politicians proposing them.

In summary, political environmentalism and citizens' attitudes appear to be the result of a complex interplay of internal and external factors. Internally, values, partisan affiliation, left-right orientation, and objective knowledge about the reality of man-made climate change all contribute to a person being more or less likely to support policies designed to tackle climate change. These relationships are further influenced by context conditions, such as citizens' socio-economic position, the economic and ecological situation of their respective countries, and the way in which climate policies are designed and communicated to the public. Where could personality become relevant in this model? In the following two subsections, I will explore two separate but mutually compatible explanations. Psychologists have investigated the links between personality traits, personal values, environmentally relevant behaviors, finding that certain traits appear to predispose people to care more about the environment and take actions to protect it. It is plausible that these same predispositions will also lead such individuals to develop a more positive stance towards political efforts to limit the impacts of climate change, even if this means making concessions regarding economic concerns and their own personal benefit. As shown by Patchen (2006) and Inglehart (1995), personal values are important determinants of public support for climate policies, and are known to depend partially on personality traits, so they are a likely intermediary variable. Meanwhile, scholars of political psychology have found personality traits to be related to different modes and outcomes of political information processing and attitude formation. It can be expected that personality traits, through these differences, also have an effect on the attitudes citizens form towards the issue of climate change and political efforts to address it.

1.2 Personality traits and environmentalism

Personality is seen as an intrinsic quality which "endures over extended periods of time" (Mondak 2010, 5), is "rooted in biology" (6), and is composed of different aspects, referred to as *traits*, which are "internally based psychological characteristics that often correspond to adjectives such as shy, kind, mean, outgoing, dominant, and so forth" (Allen 2015, 1). Psychologists have often come to the conclusion that these personality traits can be reduced to five main factors, the *Big Five*. These factors are (I) *Extraversion* or *Surgency*, (II) *Agreeableness*, (III) *Conscientiousness*, (IV) *Neuroticism* or *Emotional (In-)Stability*, and (V) *Openness (to experience)*, *Intellect*, or *Culture* (Goldberg 1990; McCrae and Costa 1987).[1] They have been frequently replicated as a basic factor structure in trait psychology and exhibit high cross-observer and cross-instrument reliability (McCrae and Costa 1987).

The personality traits described by the Big Five model have been shown to be related to human values. Values are "basic orientations," which "structure the (political) attitudes of individuals and serve to justify behavior" (Scherer and Roßteutscher 2019, 209). Schwartz (1992) distinguishes between 10 basic value domains, which are further summarized into two pairs of opposed higher-order values: self-enhancement as opposed to self-transcendence, and Openness to change as opposed to conservatism (cf. Schwartz 1992, 45). Some studies have linked the Big Five personality traits and the Schwartz value dimensions (cf. Hirsh and Dolderman 2007, 1584), but more research has been done on subsets of the value system. Pettus and Giles (1987) find that, in a socio-demographically homogeneous sample of 76 female American college students, those "who were identified as more conscientious, persistent, and goal oriented tended to display attitudes which were more favorable for maintaining environmental quality," presumably because of a stronger tendency towards planning and anticipation of consequences (Pettus and Giles 1987, 133). Pettus and Giles also find that self-confidence, which is associated with Extraversion (cf. Goldberg 1990, 1224), had a positive effect. However, as Borden and Francis (1978) find in an inquiry including both genders, this seems to apply exclusively to women. They claim that this

[1] Since the Big Five are based on lexical descriptions of personality traits and have been developed mostly on the basis of Western respondents, doubts have been expressed as to their applicability in non-Western cultural and linguistic contexts (Cheung et al. 2001; Schmitt et al. 2007). While this is an important discussion, it is no cause of concern for this paper, as the analysis is restricted to a German sample.

gender difference is probably caused by the fact that women face (or faced, in 1978) more obstacles when asserting leadership in traditional environments than in the then new environmental forum (Borden and Francis 1978, 200).

In a survey of Canadian university students, Hirsh and Dolderman (2007) have found that environmentalist values and behaviors are independently related to higher levels of Agreeableness and Openness. They argue that Agreeableness predisposes individuals to hold more environmentalist values because it favors an altruistic disposition, in which individuals expand their self-concept to include others and the environment, leading to a higher level of "environmental connectedness" (1586). Openness, which includes cognitive flexibility, may exert the same effect, and is also theorized to "enhance [the individual's] experience of nature, thereby increasing their personal valuation of the natural environment" (1590). Hirsh (2010) replicated these findings by estimating a structural equation model of personality and environmental concern based on a "much larger community sample of German adults" (Hirsh 2010, 1). In addition to Agreeableness and Openness, he also finds the factor of Neuroticism to be positively related to environmental concern. Hirsh interprets this result as showing "a more egoistic form of environmental concern" (248), in which neurotic individuals assign more weight to the negative impacts of environmental degradation. This neurotic response to the threat of environmental decline may plausibly be related to the more recently discussed phenomenon of "climate anxiety," referring to some people's experience of both cognitive-emotional and functional impairment due to their worries about climate change (Clayton 2020).

Milfont and Sibley (2012) measured associations between the Big Five and the Schwartz value "protecting the environment," as well as self-reported behaviors of electricity conservation, among New Zealanders. They find positive associations with environmental values for Agreeableness, Openness, and Conscientiousness, and negative associations for Neuroticism and Extraversion (Milfont and Sibley 2012, 190). However, these effects only translated to a higher tendency towards electricity conservation in the cases of Agreeableness and Conscientiousness. Neuroticism exhibited an adverse effect, being negatively related to environmental values but positively to behavior, while Openness and Extraversion were not significantly correlated with electricity-conserving behaviors, though the authors suspect that the null result for Openness was due to sample size (191).

Milfont and Sibley's results are unique in that they cover both the individual as well as the country level. They consistently show Agreeableness and Conscientiousness to be related to environmental protection in terms of both values and behavior. They also confirm that Openness is related to environmental values. Neuroticism, which was previously found to increase environmental concern, exhibited a negative effect here, while being positively related to behavior. Extraversion only exhibited strong associations at the country level, suggesting that underlying causal mechanisms may work differently on different levels, or individual-level effects may be confounded by an unknown source as they are transmitted onto the aggregate level.

Using not the Big Five but a related personality instrument, the six-factor HEXACO framework, Brick and Lewis (2016, 647–54) found Openness, Extraversion and Conscientiousness to be positively related to emissions-reducing behavior, but neither Agreeableness nor the sixth HEXACO trait, Honesty-Humility, which is closely related to it, showed a significant effect when controlling for the other. Emotionality, which is similar but not identical to the Big Five factor Neuroticism, also remained insignificant.

1.3 Personality in political psychology

While personality inventories and the Big Five model have been an important tool in the field of social psychology since the mid 1980s, political scientists have only begun to use them more recently, heavily pioneered by Mondak (2010). He investigated the relationship between personality and a set of variables frequently used in political psychology and sociology. Among his results is the observation that Openness significantly predicts individuals' political knowledge and attentiveness (102), but only among less conscientious individuals (114). One possible interpretation for this is that conscientious individuals feel a sense of duty to maintain a certain level of political information, whereas those who are less conscientious are only attentive and informed if they are interested in the often abstract and far-removed topic of politics, which is conditioned by Openness. Because, as explained above, knowledge is a key factor in determining a person's concern about climate change, it can be expected that this relationship becomes relevant for their degree of political environmentalism as well. As Patchen (2006) shows, self-efficacy is another important predictor of attitudes and behaviors related to climate change. Again, Mondak (2010,

124–26) finds that internal efficacy (i.e. confidence in one's own grasp on political affairs) is positively associated with Openness, while Conscientiousness seems to have a negative effect on both internal and external efficacy, suggesting that conscientious individuals focus more on their private lives and do not consider it feasible or desirable to pursue change in the political sphere. Finally, Mondak also finds personality to be a significant predictor of ideology or left-right orientation. Yet again, Openness and Conscientiousness show the clearest effects, with Openness seemingly predisposing people towards a more liberal or left-oriented ideology, while Conscientiousness is associated with conservatism. Neuroticism also plays a role, as more neurotic individuals exhibit a more liberal tendency, while those who are more "emotionally stable" lean in a conservative direction (128).

In recent years, the number of publications investigating the influence of personality on political attitudes and ideologies has exploded. Results in this area have cemented the understanding that innate personality is a significant component in the causal relationships that determine people's political beliefs and attitudes (cf. Gerber et al. 2011; Fatke 2019; Bakker and de Vreese 2016; Curtis and Miller 2021). With climate change being one of the most discussed political topics today, and considering that attitudes towards it are significantly different across ideological and partisan divides (cf. Dunlap, Xiao, and McCright 2001; Patchen 2006; Van Boven, Ehret, and Sherman 2018), it is reasonable to assume that personality also plays a role there.

2 Empirical analysis

2.1 Hypotheses

Having reviewed the evidence about the role of personality traits in the formation of environmental and political attitudes, I will attempt to condense my expectations into a set of testable hypotheses. The dependent variable is political environmentalism. Following Milfont and Sibley (2012), I differentiate between an abstract measure of value priority, i.e. how important the limitation of climate change impacts is to citizens in comparison to general economic advancement, and a more practical dimension of support for specific climate policies. The two policies I have selected are a tax on carbon dioxide emissions, and a halt to the new registration of cars with petrol or diesel engines from 2030 (henceforth

briefly referred to as "combustion ban"). Both policies have received significant public attention in Germany. Finally, I include a fourth dependent variable, support for the continued use of nuclear power, to differentiate between climate-specific and general environmentalist attitudes. Nuclear power, which Germany will stop using by 2022, is considered environmentally harmful due to radioactive waste, but does not contribute strongly to climate change. As independent variables, I include the Big Five factors and an additional measure of Risk Aversion. The inclusion of Risk Aversion is motivated by the fact that policy perception, including considerations of fairness and cost distribution, has proven to be a relevant factor in people's attitude towards climate policies like the carbon tax. By including Risk Aversion, I hope to get a more nuanced picture of the way in which personality traits influence policy attitudes, without controlling for a large battery of interaction effects, which would exceed the constraints of this paper.

Before considering hypotheses regarding specific personality traits, a null hypothesis must be tested concerning the general effect of personality on political environmentalism. Because this is, to my knowledge, the first analysis of this specific relationship, it is at least possible, though somewhat implausible, that these two phenomena are entirely unrelated. The null hypothesis is that personality traits do not contribute significantly to explaining variance in political environmentalism.

Out of the big five indicators, the literature review has rendered the clearest picture for the fifth factor, Openness to Experience. As discussed above, Openness is related to an expanded self-concept, values emphasizing self-transcendence rather than self-enhancement, and to an increased curiosity. All of these associations suggest that individuals who score high on Openness will have better knowledge of climate issues and exhibit higher levels of environmental concern, which has been repeatedly confirmed in empirical studies. I suspect that this concern will translate into a higher importance of climate preservation versus economic considerations. Openness is also linked to a higher capacity for abstract and long-term thinking, cognitive flexibility, and a greater acceptance for unconventional ideas and solutions (Milfont and Sibley 2012, 188). As a consequence of this, I expect more open individuals to be more likely to support controversial climate policies. I am uncertain whether this support will extend to the continued use of nuclear power, since individuals scoring high on Openness will be more likely to give credit to more novel, "secure" nuclear

technologies, but their greater capability for imagination may also lead them to have a more vivid notion of the potential disastrous consequences of a nuclear accident.

Agreeableness is linked to higher levels of empathy and concern for others, which may extend to future generations or to populations that are most severely affected by climate change. Agreeable individuals are expected to assign greater importance to climate impacts beyond their own everyday lives, which should translate into a prioritization of climate concerns. Their expanded self-concept may also predispose them to developing an intense emotional connection to nature. However, agreeable people's higher empathy may also give greater weight to the perceived economic harms of unfair or ill-designed climate policies on the disadvantaged. Thus, their attitudes on specific policies will be highly dependent on their evaluation of those policies' design, and a general tendency cannot be assumed. Finally, the dominant anti-nuclear sentiment in German society, especially after the 2011 Fukushima accident, will be particularly influential on agreeable individuals, causing them to reject nuclear power despite its desirable climate neutrality.

Conscientiousness is linked to long-term planning and anticipation of consequences, and to increased concern for people the individual is close to (like their children), but also to values centered around self-enhancement and conservatism, as well as low political efficacy and low curiosity. While previous studies have often revealed a positive relationship of Conscientiousness and environmental concern, it is unclear whether this increased concern will translate into increased priority given to climate concerns over economic ones, especially considering that potential adverse economic impacts or costs for the conscientious individual themselves may be highly deterring. This uncertainty also applies to the effects of Conscientiousness on specific policy support. Due to their planning and conservative tendencies, conscientious individuals may also give greater credence to arguments about security of supply, which may lead them to reject the carbon tax and the combustion engine ban, while being less opposed to the continued use of nuclear power. However, the reverse may also be true if anticipation of disastrous long-term harms outweighs these concerns.

Previous findings are much less clear with regard to Extraversion and Neuroticism than to the three factors discussed above. Neuroticism has been linked to both higher and lower environmental concern, as well as to more liberal political leanings and to

environmentally positive behaviors. However, neurotic people's tendency to worry about their own future may predispose them to prioritize immediate economic over long-term climate concerns, especially in the case of policies that may carry direct costs for the individual in question. It is also reasonable to assume that neurotic people will be more worried about the threat of catastrophic nuclear accidents, and will thus reject nuclear power regardless of its climatic properties. The picture is even less clear for Extraversion, at least on the individual level. Some studies have found positive associations with both environmental concern and individual behaviors, but there is a distinct lack of theoretical explanations for these findings, especially in comparison to the other four factors.

Finally, Risk Aversion is the only indicator included in this study that has not yet received much scholarly attention in connection with environmental or climate issues. I expect risk-averse people to be opposed to nuclear power for the same reason as those with high Neuroticism scores, but effects may plausibly take either direction for the other dependent variables. Ignoring climate change or not taking adequate political measures to address it carries obvious risks of feedback loops, extreme weather events, and as yet unanticipated compound effects, while sweeping climate preservation policies are associated with high economic costs and carry a substantial risk of public backlash. Associations between Risk Aversion and policy support may grant us important insights as to which side of the equation risk-averse people assign more weight to.

2.2 Dataset and methods

To test the hypotheses, I analysed a sample of 9787 adult German citizens collected between 2016 and 2020 for the German Longitudinal Election Study panel (GLES 2021). After processing and removal of missing values, the sample size ranged between 6985 and 6993 for the different dependent variables. Participants were asked to state their opinion on the three policy proposals (carbon tax, combustion ban, nuclear power) on a 5-point Likert scale, and their prioritization between fighting climate change and achieving economic growth on a 7-point scale, which was linearly rescaled to a 1–5 interval for better comparability. To measure the Big Five, a positive and an inverted negative item were asked for each factor, using 5-point Likert scales, the mean of which became the trait score (cf. Appendix B). In addition, a simple self-assessment of Risk Aversion was

included. To test associations, I first computed bivariate product-moment correlations and then applied ordinary least squares regression, controlling for age, gender, self-assessed left-right orientation, formal education level, and net household income bracket. As an added robustness check, I also replicated the regression analysis using a binary logit model, coding responses above the middle category as positive for the dependent variables. To test the null hypothesis, I additionally computed null models, which contained only the intercept and control variables, but none of the personality indicators.

2.3 Results and discussion

Table 1: Bivariate correlations of personality traits and environmental attitudes

	Overall priority	Carbon tax	Combustion ban	Nuclear power
Openness	0.1042 ***	0.0607 ***	0.0958 ***	-0.0868 ***
	(9.0657, 7492)	(5.2627, 7490)	(8.3279, 7481)	(-7.5409, 7490)
Agreeableness	0.0613 ***	0.0151	0.0223 .	-0.0914 ***
	(5.3386, 7551)	(1.3144, 7549)	(1.9332, 7541)	(-7.9714, 7550)
Extraversion	-0.0362 **	-0.0204 .	-0.0404 ***	0.0209 .
	(-3.1477, 7560)	(-1.7704, 7558)	(-3.5153, 7549)	(1.8212, 7558)
Conscientiousness	-0.0551 ***	-0.0601 ***	-0.0721 ***	0.0148
	(-4.7869, 7536)	(-5.2269, 7534)	(-6.2733, 7527)	(1.2838, 7535)
Neuroticism	0.0195 .	-0.0037	0.0079	-0.0218 .
	(1.7005, 7570)	(-0.3224, 7568)	(0.6833, 7559)	(-1.8927, 7568)
Risk Aversion	0.0256 *	-0.0425 ***	-0.0438 ***	-0.0526 ***
	(2.247, 7670)	(-3.7281, 7669)	(-3.8376, 7660)	(-4.612, 7668)

Estimates using Pearson's product-moment correlation.
t-values and degrees of freedom are reported in parentheses.
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, . $p < 0.1$.
Data source: GLES (2021)

With the notable exception of Neuroticism, all six personality indicators show significant bivariate correlations with overall priority, with positive associations for Openness, Agreeableness, and Risk Aversion, and negative ones for Extraversion and Conscientiousness (cf. Table 1). Results are similar for both the carbon tax and combustion engine ban, except that Agreeableness is not significantly correlated with either, while their correlations with Risk Aversion are negative. As expected, results are notably different for support of nuclear power, which is negatively associated with Opennness, Agreeableness, and Risk Aversion. Notably, these correlations are the exact opposites of those visible

for general priority of climate change, suggesting that among German citizens, the latter is part of a more general environmentalist orientation which is not restricted to climate change, and also includes opposition to nuclear power.

Moving from bivariate to multivariate models and introducing controls for relevant socio-demographic characteristics, these results show remarkable stability. As shown in tables 2 and 3, residual sum-of-squares F-tests and χ^2 difference tests are highly significant for all eight regression models in comparison to the null models, so the null hypothesis can be confidently rejected. However, R^2 values, both total and added, are quite low for all models, and even lower for the policy questions than for general priority. This is unsurprising given that the models do not include information on values, microsociological influences, policy specifics, and context variables like media attention, all of which have a proven influence on political attitudes. Inclusion of those variables would have been unwise, as some of them are assumed to be intermediaries for the effects of personality, which would then be 'controlled out.' One option to measure personality effects in greater detail while achieving better overall fit would have been to use structural equation modeling (SEM), but this was unfeasible within the constraints of this paper.

In line with theoretical expectations, Openness appears to have strong positive effects both on the formation of environmentalist political values and on individuals' willingness to support controversial climate policies. Since Openness is negatively associated with support for nuclear power, it can be concluded that these attitudes emerge from a general environmentalist orientation underpinned by self-transcendence and curiosity, rather than a more narrow focus on climate change impacts. However, this conclusion must remain tentative, as the association between Openness and support for nuclear power loses significance in the logit model.

Agreeableness also has a positive effect on general priority, but does not appear to be significantly related to support for the carbon tax, and just barely reaches the 95% significance threshold for the combustion ban, with a comparatively effect size. This suggests that the sense of environmental connectedness which agreeable individuals have translates into an abstract valuation of the environment, but their support for policies depends on external factors. As expected, agreeable respondents were also strongly opposed to nuclear power, which can be partially attributed to a tendency to follow public opinion,

Table 2: Multivariate OLS regression results

	Overall priority	Carbon tax	Combustion ban	Nuclear power
Openness	0.1334 ***	0.0546 *	0.1526 ***	-0.0983 ***
	(0.0188)	(0.0225)	(0.0225)	(0.0218)
Agreeableness	0.0746 ***	0.0425	0.0596 *	-0.1122 ***
	(0.0218)	(0.0261)	(0.0262)	(0.0254)
Extraversion	-0.0664 ***	-0.0582 **	-0.0916 ***	0.0393 .
	(0.018)	(0.0216)	(0.0216)	(0.021)
Conscientiousness	-0.1287 ***	-0.1234 ***	-0.159 ***	0.0934 ***
	(0.0234)	(0.0279)	(0.0279)	(0.0272)
Neuroticism	-0.0138	0.0035	-0.0085	0.0058
	(0.0191)	(0.0228)	(0.0229)	(0.0222)
Risk Aversion	0.0154	-0.0505 **	-0.0587 ***	-0.0389 *
	(0.0139)	(0.0166)	(0.0167)	(0.0162)
Age	-0.0034 **	-0.0016	-0.007 ***	0.0025 .
	(0.0011)	(0.0014)	(0.0014)	(0.0013)
Gender	0.0999 ***	-0.0517	-0.0451	-0.2581 ***
	(0.0275)	(0.0329)	(0.0329)	(0.0319)
Left-Right Orientation	-0.1911 ***	-0.1665 ***	-0.1791 ***	0.1979 ***
	(0.0063)	(0.0075)	(0.0075)	(0.0073)
Education	0.047 ***	0.1202 ***	0.0622 ***	-0.0179
	(0.0099)	(0.0118)	(0.0118)	(0.0115)
Household Income	-0.004	0.0058	-0.0163 *	-0.0023
	(0.0054)	(0.0065)	(0.0065)	(0.0063)
Intercept	4.2948 ***	3.8068 ***	4.1206 ***	2.0158 ***
	(0.171)	(0.2046)	(0.2045)	(0.1987)
n	6875	6874	6871	6878
R^2	0.1596	0.1055	0.1168	0.1328
ΔR^2	0.0108	0.0052	0.0124	0.0069
F	14.6562 ***	6.5902 ***	16.0698 ***	9.1651 ***

Standard errors are reported in parentheses.
ΔR^2 and F-test are in comparison to a model containing only the control variables.
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, . $p < 0.1$
Data source: GLES (2021)

Table 3: Multivariate binary logistic regression results

	Overall priority	Carbon tax	Combustion ban	Nuclear power
Openness	0.2217 ***	0.1117 **	0.296 ***	-0.0764 .
	(0.0379)	(0.0397)	(0.0433)	(0.0429)
Agreeableness	0.1479 ***	0.0707	0.0988 *	-0.1741 ***
	(0.0442)	(0.0462)	(0.05)	(0.0493)
Extraversion	-0.1232 ***	-0.0835 *	-0.1243 **	0.0477
	(0.0364)	(0.0381)	(0.0412)	(0.041)
Conscientiousness	-0.1905 ***	-0.0725	-0.1936 ***	0.2206 ***
	(0.0474)	(0.0493)	(0.0532)	(0.0533)
Neuroticism	-0.0307	0.008	-0.0347	-0.0237
	(0.0386)	(0.0403)	(0.0438)	(0.0436)
Risk Aversion	0.027	-0.0878 **	-0.0701 *	-0.033
	(0.0282)	(0.0297)	(0.0323)	(0.0313)
Age	-0.0047 *	-0.001	-0.009 ***	0.0147 ***
	(0.0023)	(0.0024)	(0.0026)	(0.0027)
Gender	0.0186	-0.3044 ***	-0.2655 ***	-0.6588 ***
	(0.0554)	(0.058)	(0.0626)	(0.0627)
Left-Right Orientation	-0.3251 ***	-0.2332 ***	-0.2713 ***	0.2923 ***
	(0.0138)	(0.0138)	(0.0152)	(0.0148)
Education	0.1379 ***	0.2193 ***	0.1126 ***	0.0394 .
	(0.0199)	(0.0204)	(0.0221)	(0.0224)
Household Income	0.0276 *	0.0133	-0.0016	0.0129
	(0.0109)	(0.0114)	(0.0122)	(0.0123)
Intercept	1.0122 **	-0.0936	0.5046	-3.3438 ***
	(0.3459)	(0.3621)	(0.3911)	(0.3926)
n	6875	6874	6871	6878
Nagelkerke's R^2	0.1665	0.1162	0.1209	0.1443
ΔAIC	-50.1759	-11.3359	-57.1664	-20.8533
ΔBIC	-9.162	29.6771	-16.156	20.1632
$\Delta\chi^2$	62.1759 ***	23.3359 ***	69.1664 ***	32.8533 ***

"Neither agree nor disagree" / undecided responses were classified as disagreement.
Standard errors are reported in parentheses.
ΔAIC, ΔBIC, and $\Delta\chi^2$ are in comparison to a model containing only the control variables.
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, . $p < 0.1$
Data source: GLES (2021)

and partially to nature-connectedness causing an aversion towards a technology which produces pollutant waste.

The results for the factor of Conscientiousness are particularly striking. High Conscientiousness is negatively related to overall prioritization of climate concerns over economic growth and to support for both the carbon tax and combustion engine ban. These results appear especially significant because Openness has previously been strongly linked to high environmental concern. The findings suggest that this concern does not spill over into conscientious people's political attitudes, but are outweighed by something else, probably by concerns about cost and adverse economic impacts. One alternative explanation, that these effects are a result of the link between Conscientiousness and conservatism, appears unlikely, given that I controlled both for Risk Aversion and self-assessed left-right orientation — which suggests that the real impact of Conscientiousness, including effects mediated by those variables, is even larger. At the same time, Conscientiousness shows a strong positive relationship with support for nuclear power, suggesting that high Conscientiousness does not just cause people to have reservations about sweeping climate preservation policies, but that it is systematically linked to a more general anti-environmentalist political disposition. Taking into account the fact that Conscientiousness has been linked to a focus on self-enhancement values, it can be concluded that people who score high on Conscientiousness see environmental issues as something which has to be addressed outside the political sphere.

Similarly interesting results appear for the factor of Extraversion. Given the scarcity of theoretical explanations, I refused to formulate clear directional expectations or causal hypotheses about its impact on political environmentalism. Both in the OLS and the logit models, high Extraversion is significantly associated with low overall political priority given to climate change, and with low support for the carbon tax and combustion engine ban proposals. The explanation for these results remains unclear. One possibility hinges on the association between Extraversion and optimism (Goldberg 1990, 1224). Optimists may have a tendency to underestimate the adverse consequences of climate change, and thus not feel enough urgency to develop environmentalist political attitudes. Additionally, Mondak (2010, 103) finds extroverted individuals to be highly opinionated, while being comparatively less knowledgeable on political issues. In combination, these tendencies

may mean that they form strong, rigid opinions on climate policy before engaging with the full breadth of scientific knowledge available to them.

Risk Aversion is negatively associated with all three policy proposals but shows no significant association with overall priority. It appears to have no direct influence on the formation of environmentalist political values, but increase general reluctance towards policy proposals. Finally, effects for Neuroticism have not achieved statistical significance in any model, suggesting that it does not play a significant role in the formation of environmental political attitudes.

Conclusion

I assessed the relationship between the innate personality traits of German citizens and their level of political environmentalism, both on the level of overall priority and support for a range of controversial policy proposals. I found that Openness to Experience strongly predicts both general and policy-specific environmentalist attitudes, including, but notably not limited to, limiting the harmful consequences of climate change. High Agreeableness was another predictor of overall priority given to climate policy, but was not significantly associated with specific policy support in either direction. Meanwhile, Conscientiousness was the strongest negative predictor of political environmentalism in all its operationalizations, with additional negative associations measured for Extraversion. Risk Aversion was negatively associated with support for policy proposals, but not with general priority.

These findings hold some implications for policy. First, actors interested in developing and communicating successful climate policies must understand that citizens' perceptions of risk, cost distribution, and economic impacts can activate reluctant tendencies inherent to those citizens' personalities. Therefore, communication should emphasize fairness and solidarity concerns, while simultaneously de-emphasizing risks associated with policy implementation. On the other hand, citizens with personalities defined by high Openness may better respond to policy proposals if they emphasize excitement, imagination, and originality.

More detailed theoretical explanations are required for the results presented here,

especially with regard to Risk Aversion and Extraversion. Future research would do well to develop more comprehensive and sophisticated models, including intermediary variables such as personal values and context factors such as media attention, and potentially using more advanced methods, such as structural equation modeling. Doing so could offer a more detailed view on the causal pathways through which personality traits influence environmental attitudes. Finally, this analysis was limited to adult German citizens. However, policy attitudes are highly sensitive to the national political and socio-economic context and the specific design aspects of proposals made by real political actors in the respective countries. Because of this, these results should be replicated in different national or cross-national contexts before they can be taken to be universally applicable.

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Appendix A: Measuring the Big Five in the GLES

The GLES survey contained a battery of 15 personality questions connected to the Big Five structure, but only 10 of these are listed in the questionnaire documentation's table of contents. These 10 items broadly correspond to those of the Ten-Item Personality Inventory (TIPI) developed by Gosling, Rentfrow, and Swann (2003). Both 10-item and 15-item instruments have previously been used to measure the Big Five and have exhibited good inter-rater reliability, while their performance in confirmatory factor analyses has been mixed (Lang et al. 2011; Gerlitz and Schupp 2005). In this case, both the 10-item and 15-item inventory performed equally mediocrely when subjected to confirmatory principal component analyses (cf. tables 4 and 5). In both versions, items loaded consistently onto the expected factors for Extraversion, Openness, and Neuroticism, while there was noticeable amount of cross-loading for Agreeableness and Conscientiousness. However, this does not necessarily disqualify the instruments (cf. Gosling 2021). I decided to use the 10-item version, as it is better documented and more parsimonious, and the 15-item version does not appear to offer notable improvements.

Table 4: Principal component loadings for 10 personality items

	PC1	PC2	PC3	PC4	PC5
Item A (¬Extraversion)	0.8609	0.1568	0.0418	0.0525	-0.092
Item B (Extraversion)	-0.7412	0.2881	0.0335	-0.1048	0.1592
Item D (¬Conscientiousness)	0.3752	-0.2356	0.6796	0.0589	0.0036
Item F (Conscientiousness)	-0.1444	0.8007	-0.0178	-0.0354	0.0532
Item G (Openness)	-0.1736	0.4025	0.1314	-0.7058	0.106
Item H (¬Openness)	0.0197	0.0709	0.1743	0.897	0.0301
Item K (Neuroticism)	0.4219	0.0047	0.2247	0.0121	-0.703
Item L (¬Neuroticism)	-0.0137	0.1422	-0.0195	-0.0312	0.9142
Item N (Agreeableness)	0.0957	0.729	-0.209	-0.0953	0.0813
Item O (¬Agreeableness)	-0.1657	-0.038	0.8308	0.0421	-0.1589

Total explained variance: 72.63 %.

Table 5: Principal component loadings for all 15 personality items

	PC1	PC2	PC3	PC4	PC5
Item A (Extraversion)	-0.8086	0.1691	-0.0319	0.1431	-0.0016
Item B (¬Extraversion)	0.7918	0.1857	0.1421	-0.0985	0.0032
Item C (Extraversion)	0.7807	0.2532	0.2175	-0.0547	0.012
Item D (¬Conscientiousness)	-0.344	-0.2742	-0.034	0.0867	0.4782
Item E (Conscientiousness)	0.1304	0.768	0.0634	0.0085	-0.1065
Item F (Conscientiousness)	0.0657	0.7797	0.1172	-0.1083	0.0101
Item G (Openness)	0.1439	0.2864	0.767	-0.0609	0.0532
Item H (¬Openness)	-0.0189	0.1307	-0.8007	-0.0481	0.236
Item I (Openness)	0.3296	0.3072	0.6722	-0.1154	0.1155
Item J (Neuroticism)	-0.031	0.1864	0.0023	0.7862	0.1188
Item K (Neuroticism)	-0.3998	-0.0803	-0.0144	0.7014	0.1568
Item L (¬Neuroticism)	0.0422	0.2354	0.0731	-0.779	-0.0236
Item M (¬Agreeableness)	0.0566	-0.1113	-0.0325	0.0706	0.7954
Item N (Agreeableness)	0.0214	0.5653	0.1372	0.0333	-0.3869
Item O (¬Agreeableness)	0.0444	0.0019	-0.0109	0.1277	0.7874

Total explained variance: 64.73 %.
Rotation method: Varimax. Number of components forced to 5.
Data source: GLES (2021)

Personality items included in the GLES questionnaire (GLES 2021, kp1_2180a – o):

A) I tend to be somewhat shy and reserved.
B) I am extroverted and sociable.
C) I am communicative and talkative.
D) I am lazy.
E) I perform tasks very thoroughly.
F) I work effective and efficiently.
G) I have an active imagination and am inventive.
H) I have little artistic interest.
I) I am inventive and propose new ideas.
J) I worry a lot.
K) I easily get nervous and uneasy.
L) I am relaxed. Stress does not upset me.
M) Sometimes I am a little rough with others.
N) I am considerate and friendly with others.
O) I tend to criticize others.

Appendix B: Replication Notes

This paper was written using RMarkdown (Allaire et al. 2021). All statistical computations were performed using R (R Core Team 2021). The full source code for the paper, commented R scripts for all included and supplementary computations, and instructions for replication are publicly available as a Git repository at https://github.com/Seitzal/climatepsych.