

ARTICLE

The role of framing and effort in green nudging acceptance

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Abstract

Whether nudges succeed in promoting pro-environmental behavior strongly depends on their public acceptance. Prior literature shows that the framing of nudges, i.e., whether they address the individual (personal framing) or the society (societal framing), is one critical factor in determining nudging acceptance. Since a personal framing highlights the costs individuals have to bear to comply, we hypothesize that people accept nudges more when addressing the general public rather than themselves personally. We expect the framing effect to be stronger for nudges that elicit high-effort behavior than low-effort behavior. Results of multilevel linear regression analyses in two online experiments ($n_{\text{Study 1}} = 294$, $n_{\text{obs}} = 4,410$; $n_{\text{Study 2}} = 565$, $n_{\text{obs}} = 11,300$) reveal an opposite pattern: People accept nudges more when personally (vs societally) framed. As predicted, nudges receive higher support when the promoted behavior is perceived as low effort. Exploratory path analysis in Study 2 shows that the perceived effectiveness of the nudge mediates the positive relation between personal framing and nudging acceptance. This project provides novel insights on facilitators and barriers in nudging acceptance and their implications for policy-making.

Keywords: nudging acceptance; framing; effort; pro-environmental behavior

Introduction

Climate change is a major concern for EU citizens, with 77% perceiving it as a serious problem and 22% considering it the primary global challenge (Baiardi and Morana, 2021). However, people's pro-environmental awareness does not always translate into pro-environmental behavior (PEB), i.e., behavior that benefits or minimizes harm to the environment (Stern, 2000; Kollmuss and Agyeman, 2002; Steg and Vlek, 2009). PEBs, such as consuming less meat or using public transport instead of a private car, do not hinge solely on individual motivation and effective self-regulation strategies (Wenzel *et al.*, 2021) but also on external contextual factors that lie beyond the individual's self-control (Ölander and Thøgersen, 1995; Stern *et al.*, 1999;

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Van Raaij, 2002; Thøgersen, 2005), e.g., access to public transport or the availability of sustainable food options in restaurants.

To promote PEB, policymakers increasingly employ behavioral interventions such as nudges (Thaler and Sunstein, 2021) that aim to shape individual behavior by adapting their choice architecture, making sustainable choices more accessible and appealing. Compared to traditional public policies like mandates, bans, taxes, and subsidies, a nudge is defined as a change in the decision context that influences people's behavior without prohibiting any choices or significantly changing economic incentives (Thaler and Sunstein, 2021). The term 'green nudges' has been introduced to distinguish between nudges that primarily improve the welfare of an individual (e.g., higher financial savings or healthier lifestyles) and nudges that reduce negative environmental externalities (e.g., waste accumulation or resource use; Carlsson *et al.*, 2021). Popular examples of green nudges are defaulting consumers to vegetarian meals in canteens (Campbell-Arvai *et al.*, 2014) and providing information on energy consumption relative to neighbors to motivate households to save (Allcott, 2011; Bergquist and Nilsson, 2018).

To widely implement green nudges, acceptance of those nudges from a majority of the public is crucial (Reynolds *et al.*, 2020). Green nudges that encounter reactance from the public might be less likely to be implemented and more likely to be dismissed. In democratic countries, policymakers hesitate to adopt public policies without sufficient public support (Steg *et al.*, 2006; Cullerton *et al.*, 2016; Howes *et al.*, 2017). Therefore, understanding the facilitators and barriers of nudging acceptance is essential for policymakers to develop feasible and successful green nudge policies.

Previous research has identified various factors influencing policy acceptance, including (green) nudging acceptance (for a comprehensive review, see Grelle and Hofmann, 2024). These determinants encompass not only psychological factors like problem awareness and trust in the government (e.g., Evers *et al.*, 2018; Sunstein *et al.*, 2019) but also nudge-specific factors such as perceived transparency, intrusiveness, effectiveness and the costs associated with the nudge implementation (e.g., Reisch and Sunstein, 2016; Sunstein, 2016; Evers *et al.*, 2018; Bang *et al.*, 2020; De Ridder *et al.*, 2022).

A particularly powerful factor that may increase people's willingness to accept nudges is the message framing of those nudges. Message framing involves directing the audience's focus in a way that makes the message more convincing (e.g., Petty and Cacioppo, 1986; Maheswaran and Meyers-Levy, 1990; Davis, 1995; Chong and Druckman, 2007). According to the framing theory (Chong and Druckman, 2007), emphasizing specific aspects of information can significantly influence how the audience perceives and interprets the message.

Previous studies show the significant impact of personal vs societal framing on public policy acceptance (Cornwell and Krantz, 2014; Jung and Mellers, 2016). Cornwell and Krantz (2014) found higher support for policies when their justification was framed in terms of 'people in general' (societal framing) compared to 'themselves' (personal framing). Jung and Mellers (2016) conducted an experimental study on American attitudes toward nudges, examining framing effects on nudging acceptance by manipulating the target (personal vs societal) and reference point (costs vs benefits) of the nudge description. While there was no overall framing effect on nudging

acceptance, they discovered that empathetic individuals were more receptive to nudges emphasizing societal costs or benefits. Conversely, reactant individuals were more resistant to nudges when framed in terms of personal costs of rejection.

One important factor to consider in understanding the framing effect is the effort people associate with the behavioral change promoted by the nudge. Prior research has shown that nudges receive less support from individuals who enjoy and engage in the behavior targeted for change (Sunstein *et al.*, 2019). Generally, citizens are more likely to reject policies that they perceive to impose high financial or psychological costs, such as effort or restricted freedom of choice (de Groot and Schuitema, 2012; Rodriguez-Sanchez *et al.*, 2018; Haggmann *et al.*, 2019). When personal (vs societal) nudge frames highlight the individual effort required for environmental protection, it may lead to lower acceptance, as people may seek to avoid these efforts.

Understanding when and how different message frames are effective in communicating pro-environmental policies is crucial for successful policy-making. To achieve a comprehensive understanding, it is essential to study the effects of message framings within specific behavioral domains and target groups (Neale *et al.*, 1987; Bless *et al.*, 1998; Tabesh *et al.*, 2019). Currently, there is limited empirical evidence on how personal vs societal framing impacts nudging acceptance, particularly in the environmental domain. This study aims to fill that gap by providing novel insights into the impact of message framing on green nudging acceptance.

We conducted two online experiments to investigate how nudging acceptance depends on nudge-framing (societal vs personal) and perceived effort attached to the promoted behavior, focusing specifically on the environmental decision-making context, i.e., on green nudges.

Pre-registered hypotheses

For Study 1 and Study 2, we pre-registered the following hypotheses:¹

H1. People are more likely to accept nudges when addressing people in general (societal framing) rather than addressing themselves (personal framing).

Since higher costs (financially or psychologically) attached to a certain climate policy are associated with lower acceptance of that policy (e.g., de Groot and Schuitema, 2012; Rodriguez-Sanchez *et al.*, 2018; Haggmann *et al.*, 2019), we hypothesize that

H2. People are more likely to accept green nudges if they perceive the behavior encouraged by the nudges as low effort rather than high effort.

¹We pre-registered further hypotheses on problem awareness and green nudging acceptance (see pre-registration on https://osf.io/5tjdy/?view_only=61449a06d7b44514bfa97e746b35c140). Based on the suggestions from the reviewers on coherence and the ease of readability, we exclude them from this paper. The analysis did not reveal any significant effects. To be transparent, the analysis and results for those hypotheses can be found in the Appendix.

As the personal (vs societal) nudge framing highlights the effort for the individual to mitigate climate change, we expect that:

H3. The effect that higher perceived effort is associated with lower green nudging acceptance (H2) is stronger in the personal framing condition compared to the societal framing condition.

We further pre-registered to control for policy effectiveness and intrusiveness in our analysis,² as they are significant predictors of public policy acceptance among various policy-specific attitudes (see Grelle and Hofmann, 2024).

Study 1

Methods

Participants

We recruited 299 participants via the platform *Prolific*. After excluding data from participants who failed an attention check or completed the survey in less than two standard deviations below the average time duration ($M_{\text{time (sec)}} = 1006.5$, $SD_{\text{time (sec)}} = 546.4$), our final sample consisted of 294 participants ($M_{\text{age}} = 26.77$, $SD = 8.85$, ranging from 18 to 64 years, 35.4% female, 50% with University Degree). Around 40% of the sample identified as German nationality (Supplementary Table A1). We ensured that only fluent German-speaking people could participate in the survey, as it was conducted in German.³

Procedure

In an online experiment using the software *Qualtrics*, participants estimated the effort involved in reducing specific behaviors in five environmental decision-making contexts (meat consumption, plastic consumption, energy consumption, car driving, and plane travel). They were then randomly assigned to one of two conditions: societal framing or personal framing. In the societal framing condition, participants assessed acceptance, perceived effectiveness and intrusiveness of societally framed green nudges (using the third person plural pronoun ‘they’). In the personal framing condition, the same nudges were presented but personally framed (using the second person singular pronoun ‘you’), e.g., ‘In canteens, visitors (*you*) can choose from various vegetarian dishes. If they (*you*) would like to have meat as a side dish, they (*you*) must state this explicitly when ordering’, (Campbell-Arvai *et al.*, 2014). Each participant evaluated 15 nudges, including defaults, social comparison and feedback nudges for each context (Supplementary Table C1). Demographic data, including age, gender, education and political orientation, were also collected. Participants received compensation of 8.3 GBP/hour upon completing the survey.

²In Study 2, we further pre-registered policy transparency as a control variable, see footnote 8.

³Besides our positionality as authors as German citizens, we selected Germany as our study location to investigate nudging acceptance due to its significance as one of the largest European economies, which is characterized by high levels of consumption and being one of the main emitters, among other factors.

Measures

To measure our dependent variable, nudging acceptance, participants were asked to rate (1) their level of agreement with the introduction of the measure, (2) their willingness to sign a petition for it and (3) their opposition to the measure (reversed item) on a Likert scale from 1 (not at all) to 7 (very much). We calculated the average score of these three items as a measure of nudging acceptance (Cronbach's $\alpha = 0.78$) after reversing item 3. Participants also provided estimates of the nudge's effectiveness in reducing certain behaviors (e.g., energy consumption) and its intrusiveness in everyday life on a Likert scale from 1 (not at all) to 7 (very much). Additionally, participants indicated the perceived effort required to change their behavior (e.g., energy consumption, meat consumption, car usage, air travel, plastic use) on a Likert scale from 1 (not effortful at all) to 7 (highly effortful).

Analysis

Since participants' responses were nested within domains, we conducted multilevel linear analyses (level 1 = domains and level 2 = individuals) using the statistical software R (version 1.3.1093). Continuous predictors were person-centered by subtracting their means to improve intercept interpretation. For Study 1 and Study 2, all hypotheses, materials used, planned procedures and analyses were pre-registered on the Open Science Framework (OSF:⁴ https://osf.io/5tjdy/?view_only=61449a06d7b44514bfa97e746b35c140).

Results

Results ($n = 294$, $n_{\text{obs}} = 4,410$) indicate a generally high willingness to accept green nudges across the different domains and nudge types ($M = 4.80$, $SD = 1.57$). Contrasting our prediction ($H1$), participants were descriptively *more* willing to accept nudges when they are personally (vs societally) framed ($\beta = 0.16$, $p = 0.13$; see [Figure 1](#) and [Table 1](#)), but this effect was not statistically significant.⁵ This relationship remained statistically insignificant when controlling for perceived nudge effectiveness and intrusiveness.⁶ As expected ($H2$), lower perceived effort was associated with higher acceptance ($\beta = -0.07$, $p < 0.001$). The perceived effort did not significantly change the relationship between nudge framing and nudging acceptance ($\beta = -0.06$, $p = 0.05$; $H3$).⁷ Results are discussed in the overall discussion.

⁴The present article only reports the hypotheses, analyses and materials relevant to this study. See OSF for the complete material.

⁵Note that including policy type as a categorical factor in our models (as pre-registered) does not significantly change our results (see Supplementary Appendix Table C2).

⁶Going beyond our pre-registration, we re-conceptualized nudge effectiveness and intrusiveness as potential mediators (rather than just control variables) and explored possible mediation effects in both studies. In Study 1, multilevel path analyses revealed that neither policy effectiveness nor intrusiveness mediated the main link between framing and nudging acceptance.

⁷Note that the p-value ($p = 0.054$) of the interaction effect of nudge framing and effort on acceptance was very close to the border of not significant ($p > 0.050$). Therefore, we refrained from discussing this finding.

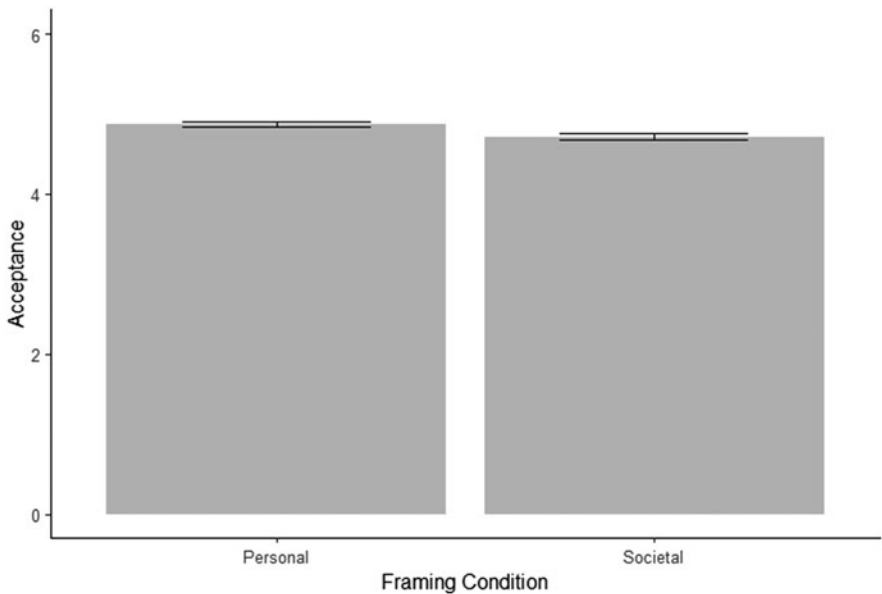


Figure 1. Bar plot of green nudging acceptance per nudge-framing condition with SE (Study 1).

Note. Societal framing condition ($n_{\text{societal}} = 147$, $n_{\text{obs}} = 2205$) and personal framing condition ($n_{\text{personal}} = 147$, $n_{\text{obs}} = 2205$).

Limitations

We identified three main limitations of Study 1. Firstly, the lack of a neutral control condition (i.e., neutral framing) prevents us from determining the effectiveness of the experimental framing conditions *per se* (i.e., we cannot determine whether the personal or societal framing dominantly affects nudging acceptance). Secondly, the use of the formal third person ‘Sie’ (‘you’) for the personal framing condition in German may have introduced confusion with the plural ‘sie’ (‘they’), potentially reducing the framing effect between the experimental conditions. Lastly, the limited representation of participants of German nationality (40%) may restrict the generalizability of our findings, as country-specific political systems and challenges can influence public policy acceptance.⁸

Study 2

We conducted a second study to address Study 1’s limitations and test our hypotheses with higher statistical power. We introduced a generic-framing condition using the German indefinite pronoun ‘man’ similar to ‘one’ in English. This allowed us to understand better the influence of the framing effect, determining whether personal or societal framing played a dominant role. Additionally, we used the informal

⁸For instance, in case, a given policy is already implemented or does not match with the problems the country encounters.

Table 1. Predicted values of green nudging acceptance (Study 1)

Predictors	Model 1			Model 2			Model 3			Model 4		
	β	SE	p	β	SE	p	β	SE	p	β	SE	p
(Intercept)	4.72	0.07	<0.001	4.72	0.07	<0.001	4.96	0.08	<0.001	4.73	0.06	<0.001
Framing (personal vs societal)	0.16	0.11	0.129	0.16	0.10	0.121	0.15	0.11	0.188	0.13	0.08	0.132
Effort				-0.07	0.01	<0.001	-0.03	0.02	0.094	-0.05	0.01	0.001
Framing (personal vs societal) × effort							-0.06	0.03	0.054	-0.03	0.02	0.152
Intrusive										-0.20	0.01	<0.001
Effective										0.51	0.01	<0.001
Random effect												
σ^2	1.77			1.76			2.49			1.19		
τ_{00}	0.69 _{id}			0.68 _{id}			0.76 _{id}			0.44 _{id}		
Intraclass correlation coefficient (ICC)	0.28			0.28			0.23			0.27		
N	294 _{id}			294 _{id}			294 _{id}			294 _{id}		
Observations	4410			4410			4410			4410		
Marginal R^2 / Conditional R^2	0.003/0.283			0.009/0.285			0.007/0.239			0.310/0.496		
Akaike information criterion (AIC)	15608.600			15586.837			17077.397			13892.157		

German ‘Du’ instead of the formal ‘Sie’ to mitigate language-specific limitations, and we restricted participation to individuals with their main residence in Germany.

Moreover, we included one law for each environmental domain in our presented policies to better understand whether the effects we observed for green nudging acceptance are specific to nudges. This comparison enabled us to evaluate the predictions for green nudging acceptance and examine potential differences in the effects of pro-environmental law acceptance on an exploratory basis.

Method

Participants

We recruited 600 participants via the platform *Prolific*. As in Study 1, the survey was conducted in German. Therefore, we restricted participants to individuals that are fluent German-speaking and have their main residence in Germany. After excluding data completed in less than two standard deviations below the average time duration ($M_{\text{time duration (sec)}} = 665.5$, $SD = 365.1$) and participants who failed the attention check, our final sample comprised 565 participants with 11,300 observations ($M_{\text{age}} = 27.17$, $SD = 8.38$, ranging from 18 to 69 years, 56% female, 41% with University Degree). Around 90% indicated to be of German nationality (Supplementary Table A1). This sample size provided 80% power for detecting an effect as small as 0.017 with $\alpha = 0.05$, including two predictors in the model.

Procedure

The questionnaire was developed using the *SoSci Survey* software. The overall procedure was similar to Study 1. However, compared to Study 1, in Study 2, participants were randomly assigned to one of the six conditions⁹ determining how the nudges were presented: 3 (framing: societal framing, personal framing, generic framing) \times 2 (rationale: with rationale, without rationale). Participants evaluated the policies (nudges and laws) in terms of acceptance, perceived effectiveness, intrusiveness, and transparency in each condition. Participants were compensated with 9.35 GBP/hour for completing the survey.

Analysis

To test our hypotheses, similar to Study 1, multilevel regression analyses were conducted (Level 2 = individual, Level 1 = domain) using the statistical software R (version 1.3.1093). To compare our effects on nudging acceptance with law acceptance, the same regression models were conducted but with law acceptance as the dependent variable.

⁹For the completeness of our study design, we briefly introduce the rationale condition, which, however, is not directly related to the hypotheses we test and discuss in this paper. We included the rationale condition in Study 2 to enhance the contrast between the experimental framing conditions. In each of the three conditions (personal, societal, and generic), we provided an explicit explanation of the goal of the nudge (rationale condition). This addition makes our study more comparable to the work by Cornwell and Krantz (2014), which also included a rationale. Furthermore, we extended their work by comparing acceptance ratings with and without the rationale. To assess whether participants perceived the rationale condition as more transparent compared to the non-rationale condition, we asked them to indicate the extent to which they found the goal of the presented policy transparent, in addition to assessing policy effectiveness and intrusiveness for each policy.

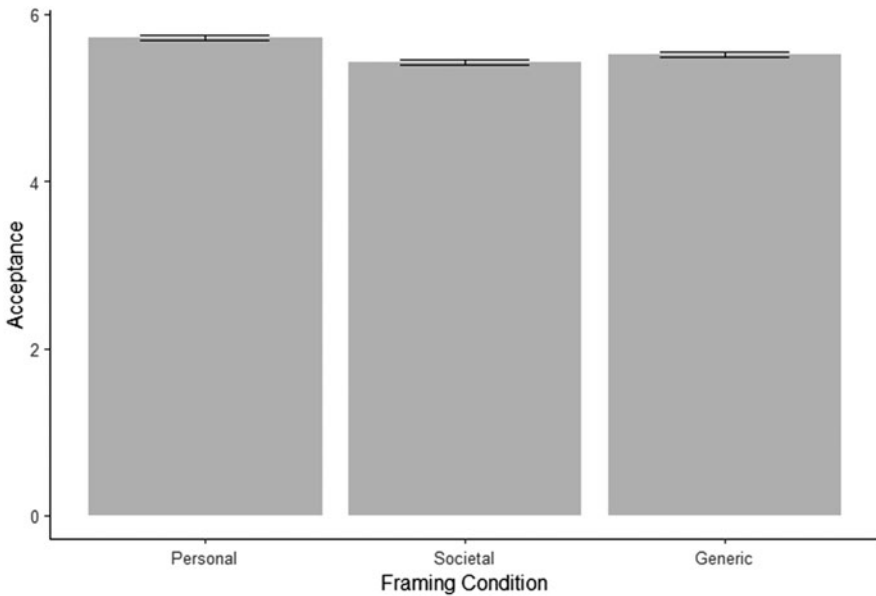


Figure 2. Bar plot of green nudging acceptance per nudge-framing condition with SE (Study 2). Note. Framing conditions: societal framing ($n_{\text{societal}} = 191$, $n_{\text{obs_societal}} = 2865$), personal framing ($n_{\text{personal}} = 186$, $n_{\text{obs_personal}} = 2790$) and generic framing ($n_{\text{generic}} = 188$, $n_{\text{obs_generic}} = 2820$).

Exploratory analyses (non-pre-registered)

To better understand the findings from Study 1 and Study 2, we explored the influence of two perceived policy qualities, namely effectiveness and intrusiveness,¹⁰ in the framing effect. Previous research has shown that policy effectiveness can mediate the relationship between personal vs societal framing and policy acceptance (Cornwell and Krantz, 2014). Therefore, we re-conceptualized effectiveness and intrusiveness as potential mediators and conducted multilevel path analyses in both studies.

Results

In Study 2 ($n = 565$, $n_{\text{obs}} = 11,300$), similar to Study 1, we observed overall high support of nudges across environmental domains and nudge types ($M = 5.37$, $SD = 1.92$). To test and compare the hypothesized framing effects with Study 1, we set the societal framing group as our reference group. Contrary to our hypothesis, we found significantly higher nudging acceptance when nudges were personally (vs societally) framed ($\beta = 0.29$, $p = 0.008$, see Figure 2 and Table 2, H1).¹¹ As predicted and similar to Study 1,

¹⁰In Study 2, we further explored the mediating effects of policy transparency, see footnote 8.

¹¹Inspecting the three different framing conditions (personal, societal and generic), results of ANOVA show significant differences in nudging acceptance ($F(2, 8472) = 19.99$, $p < 0.001$). A Tukey HSD test reveals significant differences in nudging acceptance when comparing the personal with the societal framing condition ($p < 0.001$) and the personal with the generic-framing condition ($p < 0.001$). Comparing the societal- and generic-framing conditions did not reveal significant differences in nudging acceptance ($p = 0.103$),

Table 2. Predicted values of green nudging acceptance (Study 2)

<i>Predictors</i>	Model 1			Model 2			Model 3			Model 4		
	β	SE	p	β	SE	p	β	SE	p	β	SE	p
(Intercept)	5.43	0.08	<0.001	5.42	0.08	<0.001	5.42	0.08	<0.001	5.43	0.05	<0.001
Framing (personal vs societal)	0.29	0.11	0.008	0.29	0.11	0.006	0.29	0.11	0.007	0.15	0.08	0.055
Framing (generic vs societal)	0.10	0.11	0.384	0.10	0.11	0.342	0.10	0.11	0.339	0.06	0.08	0.431
Effort				-0.10	0.01	<0.001	-0.08	0.02	<0.001	-0.06	0.01	<0.001
Framing (personal vs societal) × effort							-0.01	0.02	0.562	0.01	0.02	0.670
Framing (generic vs societal) × effort							-0.05	0.02	0.039	-0.02	0.02	0.291
Transparent										0.37	0.01	<0.001
Intrusive										-0.39	0.01	<0.001
Effective										0.26	0.01	<0.001
Random effect												
σ^2	2.16			2.14			2.14			1.22		
τ_{00}	1.01 _{id}			0.96 _{id}			0.96 _{id}			0.48 _{id}		
ICC	0.32			0.31			0.31			0.28		
N	565 _{id}			565 _{id}			565 _{id}			565 _{id}		
Observations	8475			8475			8475			8475		
Marginal R^2 / Conditional R^2	0.005/0.323			0.016/0.321			0.016/0.321			0.460/0.614		
AIC	31763.539			31665.692			31676.715			26889.585		

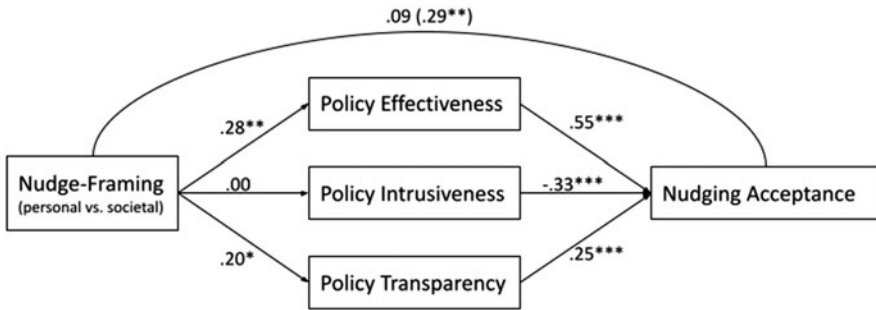


Figure 3. Mediation analysis on green nudging acceptance using multilevel path analysis.

Note. Standardized regression coefficients for the relationship between nudge-framing (personal vs societal) and the acceptance of green nudges, which are fully mediated by the perceived effectiveness of the green nudge. The total effect when excluding all mediating variables (perceived policy effectiveness, intrusiveness and transparency) is shown in parentheses (see Model 1 in Table 2).¹² Indirect effect (effectiveness): $\beta = 0.16$, $p = 0.006$; indirect effect (intrusiveness): $\beta = -0.00$, $p = 0.997$; indirect effect (transparency): $\beta = 0.05$, $p = 0.046$. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

we found that higher perceived effort led to lower acceptance ($\beta = -0.10$, $p < 0.001$, *H2*). Contrary to *H3*, the effect of effort was not moderated by the framing (personal vs societal) condition. In Study 2, explorative analyses showed the positive relation between personal framing and nudging acceptance to be fully mediated by the extent to which people found the nudge effective ($\beta = 0.14$, $p = 0.006$, Figure 3).¹³ Hence, in the personal framing (vs societal framing) condition, people perceived nudges as more effective, increasing their willingness to accept them. Interestingly, for laws, we did not find a significant framing effect on acceptance (Supplementary Table D3).

Discussion

Do people accept nudges promoting PEB more when they are societally rather than personally framed? Results from two online experiments provide consistent answers: Nudges that personally address people (via the second person pronoun) receive higher acceptance across different environmental decision-making domains than nudges addressing people in general (via the third person plural pronoun). This pattern was observed in Study 1 and became statistically significant in Study 2.

These findings contrast our predictions in *H1*. There are different potential explanations for the higher acceptance of the personal framing condition. Heightened concerns about rising greenhouse gas (GHG) emissions and their consequences for the environment and society (e.g., Poortinga *et al.*, 2018; Smith and Mayer, 2018; Baiardi

suggesting that the default manner of estimating nudging acceptance is similar to considering its impact on people in general as opposed to its impact on oneself (see Cornwell & Krantz, 2014). In a sense, this finding may reduce our concern of the limitation of not having a neutral control condition in Study 1.

¹²We also included the effects of societal vs generic nudge framing in this model. They are depicted in the Supplementary Figure C1.

¹³Note that we also found a significant effect of policy transparency mediating the positive effect between personal framing and nudging acceptance (see Figure 3). However, since the p -value ($p = 0.046$) was very close to the boundary, we refrained from discussing this finding further.

and Morana, 2021) may lead individuals to not only desire encouragement for others to behave sustainably but also to feel personally motivated to contribute to climate protection. This increased desire for self-involvement could explain the positive effect of personal framing on nudging acceptance (i.e., people want to get nudged to behave more sustainably). It is worth noting that, in general, our studies reveal high acceptance of governmental nudge interventions in the environmental domain.¹⁴

As predicted and consistent with prior literature (de Groot and Schuitema, 2012; Rodriguez-Sanchez *et al.*, 2018; Hagmann *et al.*, 2019), both Study 1 and Study 2 confirmed that higher perceived effort associated with the nudged behavior reduces nudging acceptance (H2). This finding highlights the significance of perceived effort in shaping individuals' willingness to embrace nudging interventions. Contrasting our prediction (H3), the results of both studies demonstrate that the framing effect operates independently of people's perceived effort. In other words, the perceived level of effort required to comply with it did not change the higher approval of personally framed nudges. Apparently, the framing effect we find in our studies is driven by factors other than the perceived effort. Overall, these results reveal a compelling pattern: People prefer nudges that directly impact their own behavior, yet the acceptability of such policies decreases if they require high (personal) effort. This pattern may stem from the conflicting desires for impactful nudges that can shape one's behavior and the reluctance to commit considerable individual effort.

Explorative analyses of Study 2 revealed that the positive relation between personal framing and nudging acceptance was mediated by the participants' perceptions of the nudges' effectiveness in reducing GHG emissions. Nudges that personally addressed participants were perceived as more effective, and higher effectiveness, in turn, was associated with higher levels of support. The positive relationship between perceived policy effectiveness and acceptance aligns with prior research (Reynolds *et al.*, 2020). The global scale of climate change can make people feel overwhelmed and helpless (Leiserowitz *et al.*, 2014), doubting their ability to bring about meaningful change in climate change mitigation (e.g., Jugert *et al.*, 2016; Geiger *et al.*, 2017). In response, personally framed nudges may enhance perceived control and self-efficacy. Thus, as personally framed nudges may provide more tangible guidance, they might be perceived as more effective, leading to a higher willingness to accept.

A more policy-specific explanation can be based on a series of experimental findings by Schroeder *et al.* (2017), which show that people find paternalistic help (e.g., regulations) more effective for others and agentic help (that preserves the freedom to choose, as with most nudges) more effective for themselves. This finding was explained by people's tendency to believe that they have higher cognitive capacities than others (Waytz *et al.*, 2014) and that paternalistic help is more effective for people with weaker mental capacities (i.e., others). From this perspective, people may perceive the nudges in the societal (vs personal) condition as less effective for others than for themselves, believing that more paternalistic actions are required to change

¹⁴When problem awareness was very high, we find the difference in nudging acceptance between the two experimental groups to decrease (see Supplementary Appendix Table G1). Apparently, with a very high urgency to protect the environment, people want the government to intervene independently of nudge-framing.

the behavior of others successfully. Interestingly, people frequently overestimate their own ability to regulate their behavior while underestimating others' capacity for regulation (Buehler *et al.*, 1994; Nordgren *et al.*, 2009; Peetz and Kammrath, 2013). Paternalistic help diminishes the need for self-regulation and might, therefore, be perceived as more suited for others. Conversely, agentic help allows greater freedom and autonomy and is therefore preferred. This line of thought is supported by the fact that we do not find a personal framing effect in the case of laws, suggesting that it may only apply to less restrictive policies such as nudges. Further research is needed to delve into the reasons behind the higher perceived effectiveness of personally framed nudges.

Our findings contradict Cornwell and Krantz's (2014) research, which linked societal framing to positive policy acceptance mediated by policy goal achievement. However, this discrepancy may stem from our exclusive focus on environmental nudges. As pointed out above, the environmental domain's unique urgency in mitigating climate change may influence attitudes toward policies. People may want to get involved to counter climate change in response to its urgency. At the same time, its global scale evokes uncertainty and overwhelm, making people more receptive to governmental support in the form of nudges.¹⁵

Notably, our sample primarily comprised politically left-leaning individuals in their 20s or early 30s (see Supplementary Table A1). They may be more affected by climate change consequences and more eager to engage with and accept nudges. As left-wingers often prioritize environmental protection (e.g., Gifford and Nilsson, 2014), they are more likely to embrace personally framed nudges over societal framing. To enhance the generalizability of our findings, future research should address this limitation by replicating the study with a more diverse and representative sample.

Finally, we chose to use Prolific as a data collection platform as it offers high data quality compared to similar platforms (e.g., Peer *et al.*, 2017; Douglas *et al.*, 2023), which can be comparable to lab studies (Peer *et al.*, 2017). However, a major limitation to consider is the potential WEIRD (Western, Educated, Industrialized, Rich and Democratic) bias. Prolific's participant pool may be skewed toward women, young individuals and those with higher education levels, potentially limiting the generalizability of our findings.

Conclusion and policy implications

Our findings reveal a noteworthy pattern: People are more willing to accept green nudges that address them directly over those addressing people in general, as they perceive them to be more effective in promoting sustainable behavior. At the same time, people prefer green nudges that are effortless, aiming to minimize the required effort of behavior change. These findings have important policy implications that can inform effective environmental interventions.

Based on our results, policymakers can increase the acceptance of green nudges by framing them personally (vs societally). By presenting nudges in a way that directly

¹⁵Compared to 2014, when Cornwell and Krantz conducted their study, the urgency to combat climate change has increased, which may also partly explain the different results regarding our main link H1.

addresses individuals, policymakers can leverage the perceived effectiveness of such interventions to encourage more sustainable practices. This suggests that policymakers should engage with the public and invest in communicating the nudges' effectiveness in promoting sustainable practices. However, it is essential to recognize that green nudges aimed at behaviors demanding substantial individual effort may encounter challenges in garnering widespread support. In such instances, complementary system-change interventions, such as regulations and taxation, might be necessary. Combined with system-changing measures, green nudges can be a promising intervention tool to positively impact a greener future. According to this project's results, people want to take an active part and are willing to accept government interventions in combating climate change. This finding demonstrates public support for green nudges and highlights an opportunity for policymakers to take action in combating climate change.

Supplementary material. To view supplementary material for this article, please visit <https://doi.org/10.1017/bpp.2024.8>.

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References

- Allcott, H. (2011), 'Social norms and energy conservation', *Journal of Public Economics*, **95**(9–10): 1082–1095. <https://doi.org/10.1016/j.jpubeco.2011.03.003>.
- Baiardi, D. and C. Morana (2021), 'Climate change awareness: empirical evidence for the European Union', *Energy Economics*, **96**: 105163. <https://doi.org/10.1016/j.eneco.2021.105163>.
- Bang, H. M., S. B. Shu and E. U. Weber (2020), 'The role of perceived effectiveness on the acceptability of choice architecture', *Behavioural Public Policy*, **4**(1): 50–70. <https://doi.org/10.1017/bpp.2018.1>.
- Bergquist, M. and A. Nilsson (2018), 'Using social norms in smart meters: the norm distance effect', *Energy Efficiency*, **11**(8): 2101–2109. <https://doi.org/10.1007/s12053-018-9709-6>.
- Bless, H., T. Betsch and A. Franzen (1998), 'Framing the framing effect: the impact of context cues on solutions to the 'Asian disease' problem', *European Journal of Social Psychology*, **28**(2): 287–291. [https://doi.org/10.1002/\(SICI\)1099-0992\(199803/04\)28:2%3C287::AID-EJSP861%3E3.0.CO;2-U](https://doi.org/10.1002/(SICI)1099-0992(199803/04)28:2%3C287::AID-EJSP861%3E3.0.CO;2-U).
- Buehler, R., D. Griffin and M. Ross (1994), 'Exploring the "planning fallacy": why people underestimate their task completion times', *Journal of Personality and Social Psychology*, **67**(3): 366–381. <https://doi.org/10.1037/0022-3514.67.3.366>.
- Campbell-Arvai, V., J. Arvai and L. Kalof (2014), 'Motivating sustainable food choices: the role of nudges, value orientation, and information provision', *Environment and Behavior*, **46**(4): 453–475. <https://doi.org/10.1177/0013916512469099>.
- Carlsson, F., C. Gravert, O. Johansson-Stenman and V. Kurz (2021), 'The use of green nudges as an environmental policy instrument', *Review of Environmental Economics and Policy*, **15**(2): 216–237. <https://doi.org/10.1086/715524>.
- Chong, D. and J. N. Druckman (2007), 'Framing theory', *Annual Review of Political Science*, **10**: 103–126. <https://doi.org/10.1146/annurev.polisci.10.072805.103054>.
- Cornwell, J. F. and D. H. Krantz (2014), 'Public policy for thee, but not for me: varying the grammatical person of public policy justifications influences their support', *Judgment and Decision Making*, **9**(5): 433–444. <https://doi.org/10.1017/S193029750000680X>.

- Cullerton, K., T. Donnet, A. Lee and D. Gallegos (2016), 'Playing the policy game: a review of the barriers to and enablers of nutrition policy change', *Public Health Nutrition*, **19**(14): 2643–2653. <https://doi.org/10.1017/S1368980016000677>.
- Davis, J. J. (1995), 'The effects of message framing on response to environmental communications', *Journalism and Mass Communication Quarterly*, **72**(2): 285–299.
- De Groot, J. I. M. and G. Schuitema (2012), 'How to make the unpopular popular? Policy characteristics, social norms and the acceptability of environmental policies', *Environmental Science & Policy*, **19**–**20**: 100–107. <https://doi.org/10.1016/j.envsci.2012.03.004>.
- De Ridder, D., F. Kroese and L. van Gestel (2022), 'Nudgeability: mapping conditions of susceptibility to nudge influence', *Perspectives on Psychological Science*, **17**(2): 346–359. <https://doi.org/10.1177/1745691621995183>.
- Douglas, B. D., P. J. Ewell and M. Brauer (2023), 'Data quality in online human-subjects research: comparisons between MTurk, Prolific, CloudResearch, Qualtrics, and SONA', *PLoS ONE*, **18**(3): e0279720. <https://doi.org/10.1371/journal.pone.0279720>.
- Evers, C., D. R. Marchiori, A. F. Junghans, J. Cremers and D. T. D. De Ridder (2018), 'Citizen approval of nudging interventions promoting healthy eating: the role of intrusiveness and trustworthiness', *BMC Public Health*, **18**: 1182. <https://doi.org/10.1186/s12889-018-6097-y>.
- Geiger, N., J. K. Swim and J. Fraser (2017), 'Creating a climate for change: interventions, efficacy and public discussion about climate change', *Journal of Environmental Psychology*, **51**(6): 104–116. <https://doi.org/10.1016/j.jenvp.2017.03.010>.
- Gifford, R. and A. Nilsson (2014), 'Personal and social factors that influence pro-environmental concern and behaviour: a review', *International Journal of Psychology*, **49**(3): 141–157. <https://doi.org/10.1002/ijop.12034>.
- Grelle, S. and W. Hofmann (2024), 'When and why do people accept public-policy interventions? An integrative public-policy-acceptance framework', *Perspectives on Psychological Science*, **19**(1): 258–279. <https://doi.org/10.1177/17456916231180580>.
- Hagmann, D., E. H. Ho and G. Loewenstein (2019), 'Nudging out support for a carbon tax', *Nature Climate Change*, **9**(6): 484–489. <https://doi.org/10.1038/s41558-019-0474-0>.
- Howes, M., L. Wortley, R. Potts, A. Dedekorkut-Howes, S. Serrao-Neumann, J. Davidson, T. Smith and P. Nunn (2017), 'Environmental sustainability: a case of policy implementation failure?', *Sustainability*, **9**(2): 165. <https://doi.org/10.3390/su9020165>.
- Jugert, P., K. H. Greenaway, M. Barth, R. Büchner, S. Eisenrauch and I. Fritsche (2016), 'Collective efficacy increases pro-environmental intentions through increasing self-efficacy', *Journal of Environmental Psychology*, **48**: 12–23. <https://doi.org/10.1016/j.jenvp.2016.08.003>.
- Jung, J. Y. and B. A. Mellers (2016), 'American attitudes toward nudges', *Judgment and Decision Making*, **11**(1): 62–74. <https://doi.org/10.1017/s1930297500007592>.
- Kollmuss, A. and J. Agyeman (2002), 'Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior?', *Environmental Education Research*, **8**(3): 239–260. <https://doi.org/10.1080/13504620220145401>.
- Leiserowitz, A., E. Maibach, C. Roser-Renouf, G. Feinberg, S. Rosenthal and J. Marlon (2014), *Climate Change in the American Mind: Americans' Global Warming Beliefs and Attitudes in November, 2013*. New Haven, CT: Yale University and George Mason University. Yale Project on Climate Change Communication.
- Maheswaran, D. and J. Meyers-Levy (1990), 'The Influence of message framing and issue involvement', *Journal of Marketing Research*, **27**(3): 361–367. <https://doi.org/10.2307/3172593>.
- Neale, M. A., V. L. Huber and G. B. Northcraft (1987), 'The framing of negotiations: contextual versus task frames', *Organizational Behavior and Human Decision Processes*, **39**(2): 228–241. [https://doi.org/10.1016/0749-5978\(87\)90039-2](https://doi.org/10.1016/0749-5978(87)90039-2).
- Nordgren, L. F., F. van Harreveld and J. van der Pligt (2009), 'The restraint bias: how the illusion of self-restraint promotes impulsive behavior', *Psychological Science*, **20**(12): 1523–1528. <https://doi.org/10.1111/j.1467-9280.2009.02468.x>.
- Ölander, F. and J. Thøgersen (1995), 'Understanding of consumer behaviour as a prerequisite for environmental protection', *Journal of Consumer Policy*, **18**: 345–385. <https://doi.org/10.1007/BF01024160>.
- Peer, E., L. Brandimarte, S. Samat and A. Acquisti (2017), 'Beyond the Turk: alternative platforms for crowdsourcing behavioral research', *Journal of Experimental Social Psychology*, **70**: 153–163. <https://doi.org/10.1016/j.jesp.2017.01.006>.

- Peetz, J. and L. Kammrath (2013), 'Folk understandings of self-regulation in relationships: recognizing the importance of self-regulatory ability for others, but not the self', *Journal of Experimental Social Psychology*, **49**(4): 712–718. <https://doi.org/10.1016/j.jesp.2013.02.007>.
- Petty, R. E. and J. T. Cacioppo (1986), 'The elaboration likelihood model of persuasion', in *Communication and Persuasion: Central and Peripheral Routes to Attitude Change*, New York: Springer, 1–24. https://doi.org/10.1007/978-1-4612-4964-1_1.
- Poortinga, W., S. Fisher, G. Bohm, L. Steg, L. Whitmarsh and C. Ogunbode (2018), *European Attitudes to Climate Change and Energy. Topline Results from Round 8 of the European Social Survey*. London: European Social Survey ERIC.
- Reisch, L. A. and C. R. Sunstein (2016), 'Do Europeans like nudges?', *Judgment and Decision Making*, **11**(4): 310–325. <https://doi.org/10.2139/ssrn.2739118>.
- Reynolds, J. P., K. Stautz, M. Pilling, S. van der Linden and T. M. Marteau (2020), 'Communicating the effectiveness and ineffectiveness of government policies and their impact on public support: a systematic review with meta-analysis', *Royal Society Open Science*, **7**(1): 190522. <https://doi.org/10.1098/rsos.190522>.
- Rodriguez-Sanchez, C., G. Schuitema, M. Claudy and F. Sancho-Esper (2018), 'How trust and emotions influence policy acceptance: the case of the Irish water charges', *British Journal of Social Psychology*, **57**(3): 610–629. <https://doi.org/10.1111/bjso.12242>.
- Schroeder, J., A. Waytz and N. Epley (2017), 'Endorsing help for others that you oppose for yourself: mind perception alters the perceived effectiveness of paternalism', *Journal of Experimental Psychology: General*, **146**(8): 1106–1125. <https://doi.org/10.1037/xge0000320>.
- Smith, E. K. and A. Mayer (2018), 'A social trap for the climate? Collective action, trust and climate change risk perception in 35 countries', *Global Environmental Change*, **49**: 140–153. <https://doi.org/10.1016/j.gloenvcha.2018.02.014>.
- Steg, L. and C. Vlek (2009), 'Encouraging pro-environmental behaviour: an integrative review and research agenda', *Environmental Psychology on the Move*, **29**(3): 309–317. <https://doi.org/10.1016/j.jenvp.2008.10.004>.
- Steg, L., L. Dreijerink and W. Abrahamse (2006), 'Why are energy policies acceptable and effective?', *Environment and Behavior*, **38**(1): 92–111. <https://doi.org/10.1177/0013916505278519>.
- Stern, P. C. (2000), 'New environmental theories: toward a coherent theory of environmentally significant behavior', *Journal of Social Issues*, **56**(3): 407–424. <https://doi.org/10.1111/0022-4537.00175>.
- Stern, P. C., T. Dietz, T. D. Abel, G. Guagnano and L. Kalof (1999), 'A value-belief-norm theory of support for social movements: the case of environmentalism', *Human Ecology Review*, **6**(2): 81–97.
- Sunstein, C. R. (2016), 'Do people like nudges?', *Administrative Law Review*, **68**(2): 177–232.
- Sunstein, C. R., L. A. Reisch and M. Kaiser (2019), 'Trusting nudges? Lessons from an international survey', *Journal of European Public Policy*, **26**(10): 1417–1443. <https://doi.org/10.1080/13501763.2018.1531912>.
- Tabesh, P., P. Tabesh and K. Moghaddam (2019), 'Individual and contextual influences on framing effect: evidence from the Middle East', *Journal of General Management*, **45**(1): 30–39. <https://doi.org/10.1177/0306307019851337>.
- Thaler, R. H. and C. R. Sunstein (2021), *Nudge: The final edition*. Yale University Press.
- Thøgersen, J. (2005), 'How may consumer policy empower consumers for sustainable lifestyles?', *Journal of Consumer Policy*, **28**: 143–178. <https://doi.org/10.1007/s10603-005-2982-8>.
- Van Raaij, W. F. (2002), 'Stages of behavioural change: Motivation, ability and opportunity', in G. C. Bartels and J. A. Nelissen (eds), *Marketing for Sustainability. Towards Transactional Policy-Making*. Amsterdam: IOS Press, 321–333.
- Waytz, A., J. Schroeder and N. Epley (2014), 'The lesser minds problem', in P. Bain, J. Vaes, and J. P. Leyens (eds), *Humanness and Dehumanization*, New York: Psychology Press, 49–67.
- Wenzel, M., S. Bürgler, Z. Rowland and M. Hennecke (2021), 'Self-control dynamics in daily life: the importance of variability between self-regulatory strategies and strategy differentiation', *European Journal of Personality*, **37**(1): 33–56. <https://doi.org/10.1177/08902070211043023>.