



# Encouraging Individual Contributions to Net-Zero Organizations: Effects of Behavioral Policy Interventions and Social Norms

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## Abstract

To contribute to a better understanding of the determinants of climate-friendly organizational behavior, we study the potential of behavioral policy interventions and social norms to foster individual contributions to organizational decarbonization initiatives. We investigate the effects of different types of behavioral policy interventions (default nudges vs. short-term boosts) in isolation and when they are combined with normative appeals to adopt climate-friendly behaviors in an organizational context. In a 2 × 2 between-subjects experiment, we find that default nudges generally induced higher individual contributions to organizational carbon compensation programs than short-term boosts. Moreover, injunctive social norm information decreased the effectiveness of both types of behavioral interventions but affected the effectiveness of short-term boosts to a stronger extent than the effectiveness of default nudges. Contributing to the nascent literature on motivating climate change mitigating behaviors in organizational contexts, we additionally explore whether factors such as personality traits, pro-social and pro-environmental beliefs, attitudes, and behaviors, and the degree of organizational identification exert an influence on the effectiveness of the interventions and provide qualitative insights into participants' reasoning for their decisions.

**Keywords** Climate-friendly organizational behavior · Organizational policy interventions · Nudge · Boost · Social norm

## Introduction

Climate change urgently needs to be addressed at multiple levels. Accordingly, organizations are called upon to implement initiatives to reduce the emission of greenhouse gases. Such initiatives require cooperation and contributions at multiple levels and their success crucially depends on individuals within the organization who may or may not support them. Understanding how to encourage pro-environmental organizational behavior is therefore essential to the success of organizational decarbonization.

Following Aguinis and Glavas' (2012) call to rethink corporate social responsibility (CSR) as a multilevel research

field, a growing research interest focuses on the psychological and sociological microfoundations of CSR (Gond & Moser, 2021; Gond et al., 2017; Jones et al., 2019; Wade & Griffiths, 2021). This strand of literature assumes that social motives are central to participation in CSR initiatives. In contrast, environmental psychology reflects the parallel relevance of self-interest and pro-social moral and normative concerns in motivating pro-environmental behavior (Bamberg & Möser, 2007; Steg & Vlek, 2009). Interestingly, both lines of research affirm the importance of considering contextual factors and habitual behavior alongside intra-personal factors when selecting intervention strategies (Steg & Vlek, 2009).

Behavioral interventions and social norms are frequently promoted as potential means to foster voluntary individual contributions to the public good of an intact natural environment (Creutzig et al., 2018, 2022; Nyborg et al., 2016). As organizational decarbonization involves all areas of activities, transformation initiatives are likely to benefit from both individual engagement and policy interventions that foster pro-environmental behavior at work (Griep et al., 2022; Lülfs & Hahn, 2014; Norton et al., 2015; Unsworth et al., 2013). To contribute to urgent and immediate action

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required to mitigate climate change, this study investigates the effects of behavioral policy interventions and social norms on individual support for an organizational decarbonization initiative.

Organizational behavior can be shaped through a variety of channels (Unsworth et al., 2013). Behavioral policy interventions like nudges and boosts aim to alter individual choices through changes in the choice architecture (Reijula et al., 2018). Nudging builds on the assumption of bounded rationality and seeks to implement mental shortcuts that steer individual decisions towards better choices (Thaler & Sunstein, 2008) by exploiting biases in intuitive judgment and decision-making. The approach thereby focuses on heuristic reasoning and intuitive processes that guide decision-making. Food choices, for example, can be improved by arranging healthier options more saliently in cafeterias, while preserving the freedom to choose less healthy options. Boosts, in contrast, are reflective interventions that seek to improve individual decision-making competencies by providing decision-makers with skills and knowledge to better structure the decision-making context (Grüne-Yanoff & Hertwig, 2016; Hertwig & Grüne-Yanoff, 2017). They thereby explicitly target analytic reasoning and reflective decision-making. For example, medical choices that involve exercising one's own agency can be altered in desirable ways by explaining statistical information to patients (Hertwig, 2017). Boosts differ from nudges in being necessarily transparent (Grüne-Yanoff & Hertwig, 2016). In contrast to nudges, they work by encouraging active cognitive reflection and thus foster conscious and deliberative decision-making processes (Hertwig & Grüne-Yanoff, 2017). Their effectiveness may therefore depend more on people's prior beliefs and willingness to cooperate in ethical decision-making contexts (Marquardt, 2010; Mertens et al., 2022; Tannenbaum et al., 2017). To our best knowledge, direct comparisons of the effectiveness of nudges and boosts in the organizational decarbonization context are absent from the literature to date. We explore whether initial findings from related (Banerjee et al., 2022) and distinct contexts (Bradt, 2019; Folke et al., 2021; Franklin et al., 2019; van Roekel et al., 2022) can be transferred to climate-friendly behaviors in organizational decarbonization contexts.

Since human behavior is strongly influenced by what others think and do, suggestions for effective policy interventions often address social norms as potentially powerful solutions in mitigation contexts (Cialdini & Jacobson, 2021; Creutzig et al., 2018; Miller & Prentice, 2016; Nolan, 2021; Nyborg et al., 2016). Complementing behavioral interventions with social norm information may be a powerful means to alter beliefs that support conformity to desired behaviors (Everett et al., 2015; Miller & Prentice, 2016). The impact of social norm information, however, depends on the context of the intervention (Bicchieri & Dimant, 2019; Gamma et al.,

2020; Reisch & Sunstein, 2016) and interventions may not always work as intended (Constantino et al., 2022; Nolan, 2021). More specifically, since climate change is both a complex phenomenon and a collective-action problem that involves conflict between short-term self-interest and long-term collective interest (Constantino et al., 2022; van Lange & Huckelba, 2021), manifold barriers and distributive conflicts must be overcome in attempts to cooperate and implement mitigation efforts and policies (Sparkman et al., 2021).

We use an experiment to explore the potential of a default nudge, a short-term boost, and combinations of both interventions with social norm information to foster individual contributions to an organizational climate change mitigation initiative. The initiative aims to motivate individuals to use discretionary funds for carbon emission compensation payments that offset unavoidable emissions arising from organizational core activities. We seek to understand which personal and organizational context factors act as motivational levers or barriers for this specific type of climate-friendly organizational behavior.

Previous research has not yet examined how different combinations of behavioral interventions play out in the urgent but highly debated social context of mitigating climate change in organizations. This study contributes to understanding the effects of behavioral policy interventions and social norms in organizational contexts in several ways.

First, by comparing the effectiveness of behavioral interventions that target heuristic reasoning and intuitive decision-making against the effectiveness of interventions that target analytical reasoning and reflective decision-making, we advance knowledge on how organizational behavior can be shaped in desired directions without using coercive measures in normative-ethical contexts such as mitigating the organizational carbon footprint. The findings show that nudges targeting intuitive decision-making slightly increase individual contributions, but are ineffective in fostering individual contributions as compared to a control condition without an intervention. In contrast, the presence of boosts as reflective interventions that rely on trust in individual motivation to contribute even reduces individual contributions. Albeit widely promoted as potential solutions in mitigating climate change, our study thus highlights that neither approach helps an organizational cause, and boosts actually hurt it. The findings therefore critically question the extent to which interventions based on reflective decision-making are suited to generate the broad support that organizational decarbonization initiatives require.

Second, the study accounts for the potential context-dependency of behavioral policy interventions by including several control variables that encompass individual characteristics and attitudes towards society, the environment, and the organization. By systematically evaluating their potential moderating roles, we explore which factors may affect

the effectiveness of both types of interventions. We further explore qualitative information on the reasons underlying decision-making, and thereby inform theory-building in the context of climate-friendly organizational behavior.

Third, we provide evidence that integrating normative appeals to conform with a reference group's views on how one should behave towards the environment may result in unintended consequences. Although social approval is a crucially important prerequisite for successful policy interventions in the climate context (Creutzig et al., 2018; Nyborg et al., 2016), this study highlights the limits that appealing to social norms in the mitigation context entails. We thereby advance the understanding of potential backfiring effects of social norm interventions in the context of climate change (Cialdini & Jacobson, 2021; Constantino et al., 2022; Sparkman et al., 2021).

## Theoretical Background and Hypotheses Development

### Determinants of Climate-Friendly Behavior

Psychological research has identified personal attitudes, norms, intentions, and values as important determinants of individual pro-environmental behavior (Ajzen, 1991; Klöckner, 2013; Onwezen et al., 2013; Stern, 2000). Stern's (2000) value-belief-norm theory conceptualizes behavior as the result of a causal chain between a person's values, beliefs, and norms relating to pro-social and pro-environmental behaviors in the public, private, and organizational spheres. Previous studies indicate that personal biospheric and altruistic values (Stern et al., 1995) and moral norms (Joireman et al., 2001; Widegren, 1998), along with pro-environmental attitudes (Katz et al., 2022) and green behavioral intentions (Norton et al., 2017) are important determinants of employee green behavior.

For organizational contexts, the literature on psychological and sociological microfoundations of CSR builds on social exchange and social identity theory in claiming that organizations engage in CSR to foster employees' trust and organizational identification (Cropanzano & Mitchell, 2005; Farooq et al., 2014; Norton et al., 2017). This line of research assumes that substantive organizational engagement in social and environmental initiatives and a positive green psychological climate can foster employee engagement in organizational CSR initiatives (Chang, 2020; Norton et al., 2017; Vlachos et al., 2014, 2017). Empirical studies, however, approach these relations from distinct disciplines and use a variety of concepts and constructs (Francoeur et al., 2021; Gond & Moser, 2021; Wallnoefer & Riefler, 2021).

A fragmented literature further explores the relevance of a variety of possible predictors of climate-friendly behavior

at the individual level, such as personality traits (Brick & Lewis, 2016; Hopwood et al., 2021), psycho-social, cognitive, and sociodemographic factors (Thaller et al., 2020). For organizational contexts, organizational routines and habitual processes are proposed as potentially relevant determinants of sustainable employee behavior (Lülfes & Hahn, 2014; Norton et al., 2015; Ones & Dilchert, 2012; Wade & Griffiths, 2021).

The present study investigates whether behavioral policy interventions and social norms are suitable policy instruments to foster voluntary contributions of individuals that help mitigate the overall organizational carbon footprint. Compared to more coercive measures such as strict regulatory structures, these approaches promote competence, relatedness, and autonomy, thus preserving the self-determining character of pro-social and pro-environmental behaviors (Rupp et al., 2010). Specifically, we investigate the effects of nudges and boosts, two non-fiscal and non-regulatory intervention types that aim to influence behavior in desired directions while preserving people's freedom of choice (Hertwig, 2017). As outlined above, they differ in the underlying mechanism of action. Nudging builds on manipulating the choice architecture (Reijula et al., 2018) and thereby targets heuristic processes of reasoning, whereas boosts aim at developing individual decision-making competencies by providing decision-makers with skills and knowledge that enable them to better structure the decision context (Grüne-Yanoff & Hertwig, 2016; Hertwig & Grüne-Yanoff, 2017). Boosts thereby target analytic processes of reasoning that involve cognitive effort and learning. By exploring which approach is more effective in fostering voluntary individual contributions to organizational decarbonization initiatives, we seek to understand how the different mechanisms affect and guide individual climate-related behaviors.

### Behavioral Policy Interventions as Instruments to Encourage Contributions

Nudges target to directly alter behaviors through changes in the choice architecture without demanding cognitive and motivational efforts of decision-makers. The idea of nudging originates from a research paradigm that interprets decision-makers as systematically affected by cognitive and motivational deficiencies (Thaler & Sunstein, 2008). Rooted in dual-processing theories of human cognition (Evans, 2008), this intervention type exploits the finding that decision-making processes are often based on rapid, automated, and unconscious System 1 processes of human cognition (Evans, 2008; Kahneman, 2011; Kahneman & Frederick, 2002; Kahneman et al., 1982). Deliberative System 2 processes that are characterized as slow, controlled, and effortful, may, however, intervene to revise or replace heuristic responses and correct for potential biases (Banerjee, 2020; Evans, 2006,

2008). Dual-process theories of reasoning assume that the extent to which reflective System 2 processes intervene in intuitive reasoning is influenced by motivational and situational factors. Motivational factors include an individual's thinking disposition, feelings of rightness towards intuitive answers, and the importance of the decision, whereas situational factors include the available time, potential competing tasks, and other context factors (Evans, 2019). Nudging is likely to be effective if the extent to which reflective processes intervene in intuitive processing is low, or if reflective processes result in confirming the initial intuitive answer given.

An effective form of a nudge targeting the structure of decisions is the implementation of a default option that is chosen if decision-makers do not explicitly specify other options (Thaler & Sunstein, 2003). Default nudges exploit decision-makers' inertia and tendency to stick with the status quo (Samuelson & Zeckhauser, 1988). They are criticized for not being fully transparent and exploiting that people may be unaware of their presence and underlying purpose (Hertwig & Grüne-Yanoff, 2017; Rozeboom, 2021; Schubert, 2017; Siipi & Koi, 2021). Still, the effectiveness of default nudges across diverse contexts (Byerly et al., 2018; Gajewski et al., 2022; Hummel & Maedche, 2019; Mertens et al., 2022; Smith et al., 2013) and their cost-effective implementation (Benartzi et al., 2017) make them an attractive policy instrument to steer decisions in desirable directions (Reisch & Sunstein, 2016).

In contrast to nudges, boosts interpret human decision-makers as malleable individuals whose deficiencies can be overcome by providing them with skills and knowledge to improve their competencies (Hertwig & Grüne-Yanoff, 2017). The underlying simple heuristics paradigm assumes that rapid and unconscious System 1 and deliberative System 2 processes of human cognition function simultaneously, such that biases and cognitive deficiencies can be overcome (Banerjee, 2020; Hertwig & Grüne-Yanoff, 2017). Boosts are necessarily transparent to decision-makers and require their cooperation to be effective (Hertwig & Grüne-Yanoff, 2017).

Grüne-Yanoff and Hertwig (2016) differentiate between short-term boosts that seek to improve human decision-making competencies in a specific context, and long-term boosts aiming to improve general cognitive abilities. From a theoretical perspective, short-term boosts are difficult to distinguish from educative nudges (Sunstein & Reisch, 2019) or nudges plus (Banerjee et al., 2022; Bruns et al., 2018) that combine nudges with information on their presence and/or purpose and have been introduced to the literature in response to criticism of the lacking transparency of nudges (Hertwig & Grüne-Yanoff, 2017). To maintain conceptual clarity and to identify which of the mechanisms underlying the steering or empowering approach is more promising for

organizational change, we analyze the initial direct effects of a default nudge and a short-term boost.

Previous empirical research has compared the approaches in different contexts. Studies addressing risky financial decision-making conclude that boosts generate better individual financial choices (Folke et al., 2021; Franklin et al., 2019) while for the context of risk insurance, Bradt (2019) finds that nudges are more effective. A recent field study in health-care concludes that nudges have a stronger immediate effect, whereas the effect of boosts persists after the removal of the intervention (van Roekel et al., 2022). Bruns et al. (2018) test the effectiveness of default nudges in the context of voluntary contributions to carbon retirement and find that transparency relating to (1) potential behavioral influences and (2) the purpose of presenting a default does not decrease the effectiveness of the nudge. Banerjee et al. (2022) compare the effectiveness of nudge, boost, think (a purely reflective intervention, John et al., 2009), and nudge plus (a hybrid nudge-think strategy, Banerjee, 2020) in minimizing carbon-intensive food choices. They find that combining nudges with information on their presence and purpose does not reduce their effectiveness. Previous empirical evidence thus supports the effectiveness of nudges in demand-side mitigation contexts but provides limited evidence on the effectiveness of boosts.

For the organizational decarbonization context considered here, we expect that default nudges are more effective than short-term boosts in fostering contributions to carbon compensation initiatives because they require less cognitive effort, as they are inclined to fast rather than deliberative reasoning. The effect of default options is often explained by the claim that they are perceived as implicit recommendations of experts with paternalistic intentions (McKenzie et al., 2006; Ridder et al., 2022). Accordingly, we predict that individuals perceive the default contribution as the amount that is implicitly recommended by the organization. This may or may not be in line with individual preferences and attitudes towards carbon compensation. Because default nudges target System 1 processing as the dominant mode of thinking, we expect the default nudge to be successful if deliberative System 2 processes do not intervene and individuals stick with the status quo. To the extent that reflective processes intervene in the reasoning process, the appropriateness of the default value and its consistency with individual preferences may be more critically questioned. The evaluation of possible alternative uses for (parts of) the default contribution may result in lower contributions.

Short-term boosts necessarily target System 2 processes of cognition and will therefore likewise induce considerations of the appropriateness of contributions. Specifically, individuals will consider not using the (entire) amount for organizational decarbonization but instead prioritize purposes that serve individual self-interest (Miller, 1999).



Climate change can be characterized as a social dilemma in which cooperation will benefit the collective in the long term but is costly to individuals who benefit from non-cooperative behavior in the short term (van Lange & Huckelba, 2021; van Lange et al., 2018). This social and temporal conflict, along with the abstract and complex nature of climate change as a phenomenon, can foster psychological distance towards making contributions and result in lowering these. Moreover, potential negative attitudes towards the organization or the compensation of greenhouse gases may influence individuals' contributions when reflective processes intervene.

**H1** Default nudges are more effective than short-term boosts in fostering contributions to climate change mitigation.

### Social Norms as Instruments to Encourage Contributions

Prior research confirms that expectations of others' attitudes and behaviors are important determinants of cooperative behavior (Goldstein et al., 2008; Griskevicius et al., 2008; Nyborg et al., 2016). Accordingly, social norms are promoted as a potential means of creating cooperation and avoiding free-riding behavior resulting in the overexploitation of natural resources in the climate commons dilemma (Carattini et al., 2019; Nyborg et al., 2016).

Under the focus theory of normative conduct, descriptive social norms that relate to what is commonly done by others are distinguished from injunctive social norms that relate to the extent to which a behavior is commonly approved by others (Cialdini et al., 1991, 2006). Previous research has established parallels between the mechanisms underlying default nudges and social norms because default options are perceived as recommended (injunctive norm) or mostly chosen (descriptive norm) options (Everett et al., 2015). Combinations of social norms and nudges are referred to as norm-nudges, where the mechanism of action builds on social norms to change social expectations and thereby elicit desired behaviors (Bicchieri & Dimant, 2019).

The conditions under which social norm-based interventions are effective require careful consideration (Gamma et al., 2020). Prior studies document that aligned descriptive and injunctive norms exhibit synergistic effects (Borg et al., 2020; Jacobson et al., 2020), whereas interventions relying only on one type of norm message are less effective (Bonan et al., 2020). The interactive effects of descriptive and injunctive social norms are theoretically grounded in the idea that they influence behavior through different motivational mechanisms. While conforming to descriptive norms fulfills the desire to make effective decisions, conforming to injunctive social norms serves to gain or maintain social approval (Cialdini & Jacobson, 2021; Jacobson et al., 2011).

Importantly, misaligned descriptive and injunctive norms may exhibit backfiring effects if normative appeals highlight that harmful behaviors are widespread and thus form a descriptive norm. Previous studies document such backfiring effects across different contexts (Bernthal et al., 2006; Cialdini, 2003; Richter et al., 2018; Staunton et al., 2014). Individuals' willingness to conform to social norms is thus contingent upon (1) an empirical expectation that most other people conform to it, and (2) a normative expectation that most other people believe they should conform to it (Bicchieri, 2017; Bicchieri & Dimant, 2019).

In the context of climate change, a major barrier to the effectiveness of using social norms to induce behavior change lies in the prevalence of unsustainable behaviors (Sparkman et al., 2021). Although many people are concerned about environmental impact and climate change, individual pro-environmental intent often fails to result in pro-environmental behavior (Kollmuss & Agyeman, 2002; Stern, 2000). Psychological research confirms that climate change is perceived as an abstract and complex phenomenon that elicits psychological distance because its consequences affect a large collective, extend over long time horizons, and are often uncertain (van Lange & Huckelba, 2021). Individual sacrifices, in contrast, are often costly, immediate, and potentially conflicting with other values endorsed by the individual (Bouman & Steg, 2019; Bouman et al., 2021a).

Moreover, previous findings indicate that individuals tend to overestimate self-interested behaviors by others (Miller, 1999; van Lange et al., 2018) and tend to assess others to have weaker biospheric values than themselves (Bergquist, 2020; Bouman & Steg, 2019; Bouman et al., 2021b; Levison et al., 2013). Underestimating others' climate-friendly values and behaviors can inhibit the potential effects of social norm interventions in the climate context (Sparkman et al., 2021; Steg, 2023), as it reinforces perceptions that unsustainable behaviors are common in a reference group (Richter et al., 2018).

In light of these previous findings, our study solely uses injunctive norm information to emphasize the prevalence of pro-environmental attitudes and behaviors within a reference group to potentially increase contributions to climate change mitigation. Consistent with the previous evidence of backfiring effects of misaligned injunctive and descriptive norms, however, we expect that the effectiveness of both default nudges and short-term boosts will decrease rather than increase when individuals are told that others believe that one should act in pro-environmental ways, while the empirical expectation that most other people act accordingly is presumably not supported.

**H2** Injunctive social norm information decreases the effectiveness of both default nudges and short-term boosts in fostering contributions to climate change mitigation.

## Interaction of Behavioral Policy Interventions and Social Norms

Injunctive social norms are expected to decrease individual contributions in the context of climate change mitigation because of apparent inconsistencies between normative appeals to behave in environmentally friendly ways and empirical expectations of others' carbon-intensive lifestyles. We assume that this negative impact affects the effectiveness of default nudges to a lesser extent than the effectiveness of short-term boosts. Under the default nudge, the manipulation of the choice architecture directly targets behavior by exploiting a tendency to stick with the status quo that may at the same time be perceived as the recommended option. This mechanism of action is generally preserved if additional social reference information is provided. The reduction in the cognitive effort associated with the default rule thus persists when it is combined with injunctive social norm information. However, perceived inconsistencies between the normative information and empirical expectations of a reference group's behavior may trigger System 2 processes to intervene and evaluate the situation more critically than in the absence of social norm information.

The effectiveness of short-term boosts, in contrast, is rooted in active cognitive reflection and an evaluation of the consistency between individual preferences and collective goals targeted by the intervention. In line with the arguments leading to H1, we expect considerations of self-interest against collective interest in social dilemmas (van Lange & Huckelba, 2021; van Lange et al., 2013, 2018) to occur more frequently under the intervention targeting System 2 processes of cognition. Perceived inconsistencies between injunctive social norm information and empirical expectations of carbon-intensive lifestyles may therefore be stronger when combined with the short-term boost intervention, and negatively influence the process of weighing individual costs against collective benefits resulting from the decision. Therefore, we expect the negative impact of additional social norm information to be more pronounced for short-term boosts than for default nudges.

**H3** The decrease in the effectiveness of interventions induced by the presence of injunctive social norm information is stronger for short-term boosts than for default nudges.

To contextualize the impact of the (combinations of) interventions, we identify and control for several personal and contextual factors that may influence individual behavior in organizational contexts and test for moderating effects that these factors may exert on the results. Among the variety of possible influences discussed in the (fragmented) related literature (Wallnoefer & Riefler, 2021), we expect personality traits, pro-social and pro-environmental beliefs, attitudes,

and behaviors as well as the degree to which an individual perceives herself as a member of the organization (Kreiner & Ashforth, 2004; Roeck et al., 2016) to influence the relations among the effectiveness of behavioral interventions and social norms. Furthermore, we explore the relevance of individual motives and barriers to climate-friendly behavior documented in the previous literature (Gifford, 2011; Lorenzoni et al., 2007; Swim et al., 2010) in the specific organizational context studied here.

## Method

We conducted a 2 × 2 between-subjects full-factorial experiment to test the effects of the (combinations of) interventions. We manipulated the type of behavioral policy intervention as the first treatment variable (nudge vs. boost condition), and the additional presence of injunctive social norm information as the second treatment variable (social norm absent vs. present). Moreover, we implemented a control group with no treatment. Figure 1 exhibits the research model.

## Participants

The experiment involved 165 student participants enrolled at large public German universities. Due to restrictions in accessing university campuses during the COVID-19 pandemic, the experiment was conducted using an online platform. Participants were recruited with ORSEE (Greiner, 2015). Student participants form part of organizations that, at the point in time when we conducted the study (September 2020), were considerably confronted with the demands that the younger generation has on science and the social role of higher education institutions in a world threatened by climate change. 57% of the participants were male (43% female) and their mean age was 24.09 years ( $SD = 5.72$ ). Research shows that among the generation between 14 and 30 years, values such as sustainability and ecological integrity are more pronounced than in other age groups (BMU, 2018, 2019). Therefore, this age group is the most likely to exhibit injunctive social norms related to climate-friendly behaviors. Moreover, a university setting at the time we conducted the study features the unique characteristic that student initiatives like Fridays for Future are the cause of structural organizational change for a climate-neutral future, and therefore individual willingness to support the initiative is likely to be pronounced in a student sample.

## Procedure

We first asked participants to answer a detailed pre-experimental questionnaire that surveyed sociodemographic

Fig. 1 Research model

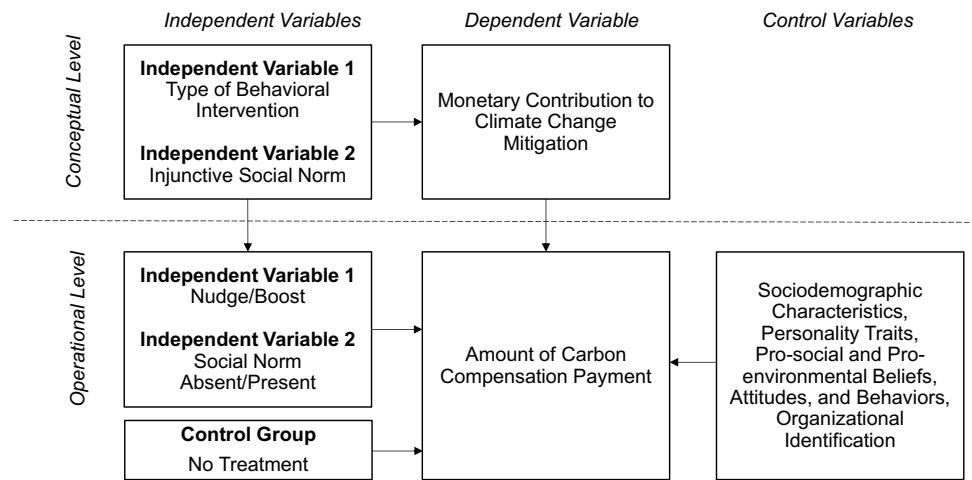
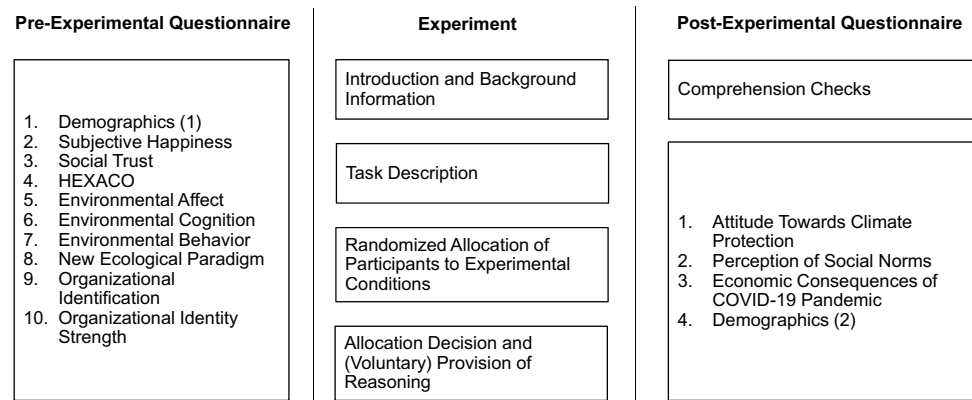


Fig. 2 Experimental procedure



factors, personality traits, pro-social and pro-environmental beliefs, attitudes, and behaviors, an ecological worldview, and the degree of identification associated with their university (Table A.1 in the Online Appendix).<sup>1</sup> Participants received a fixed compensation of €15 for answering the pre-experimental questionnaire. Figure 2 exhibits the experimental procedure.

At the beginning of the experiment, participants were informed that their university engages in reducing greenhouse gas (GHG) emissions from its operations to contribute to climate protection. Whereas GHG emission reductions are the central goal, inevitable emissions resulting from desirable activities such as student and employee commuting to the university, and academic traveling for research and study purposes are to be compensated to become a net zero-university soon. In the experiment, participants earned a fixed compensation of €10 and were given an additional

amount of €10 that was explicitly deemed to be allocated to contribute to compensate the university’s inevitable GHG emissions. Their task was to decide which share of the additional €10 they were willing to contribute to the compensation initiative. However, parts of this additional amount or the entire amount could be kept for private use. Participants’ decisions on the allocation of the additional €10 were kept confidential. On average, participants received compensation of  $M = €15.3$  ( $SD = 4.05$ ) during the experiment. The average total compensation for participation in the study was thus  $M = € 30.3$  and the average duration spent on answering the pre-experimental questionnaire and participating in the experiment was 31 min ( $SD = 8.58$ ).

After reading detailed additional information on how carbon offset projects work and which prices apply per kg of GHG emissions offset, participants were randomly assigned to one of four experimental groups (nudge/social norm absent; nudge/social norm present; boost/social norm absent; boost/social norm present) or the control group (no treatment). In the nudge conditions, we provided participants with a button to contribute a default value of €10 to carbon compensation while offering them the opportunity to opt out and choose a self-determined carbon compensation

<sup>1</sup> Table A.1 in the Online Appendix contains descriptive statistics for the items that were included in the present study. In addition to these items, further items were collected with the instrument, but these were not included in the analysis.

contribution (Bruns et al., 2018). In the boost conditions, we provided participants with additional information on the estimated average amounts of carbon that arise from desirable activities of university members and the underlying assumptions (average kilometers to commute to work and average travel kilometers per year). In addition, participants learned that by contributing the entire amount of €10 to the carbon compensation initiative, they could fully offset the average carbon emissions of one university member per year. In the social norm absent conditions, no additional information on a reference group's opinion was provided. In contrast, participants in the social norm present conditions were informed that for a large majority (86%) of students in Germany, an intact natural environment is an essential part of a good life. Furthermore, among this (reference) group, the majority (71%) say they would be willing to spend more on environmentally friendly products (BMU, 2018). This choice of injunctive social norm information was made because, on the one hand, the aspects covered by the information are shared by a majority of the reference group. On the other hand, representative and reliable information on the proportion of the reference group that fully or partially offset their carbon emissions were not available.

After making their decisions, participants were invited to explain the reasons for their decision. Last, a post-experimental questionnaire was distributed surveying participants' attitudes towards climate protection and their perception of social norms (Table A.1 in the Online Appendix).

## Measures

All measures were collected in German. For measures that were originally developed in English, we used validated translations of scales. In the absence of such, we followed the suggestions of Harkness (2003): Two researchers with different backgrounds within the research team independently translated the respective scales and resolved any inconsistencies in a subsequent discussion.

### Pro-social and Pro-environmental Personal Attitudes

We first measured subjective well-being using the Subjective Happiness Scale (Lyubomirsky & Lepper, 1999) to elicit whether personal satisfaction is relevant to the outcomes. Cronbach's alpha was 0.85. We assessed the degree of social trust using three items of the European Social Survey (2018) covering the dimensions of perceived social trust, fairness, and helpfulness as the effectiveness of social norm interventions may be affected by the degree to which individuals are connected to others (Cialdini & Goldstein, 2004; Constantino et al., 2022). Cronbach's alpha was 0.81. Next, we used the HEXACO-60 to assess the major dimensions of participants' personality structure (Ashton & Lee, 2009) as

previous research indicates that personality traits predict sustainable attitudes and behaviors (Brick & Lewis, 2016; Hopwood et al., 2021). Cronbach's alpha ranged between 0.68 (Openness to experience) and 0.77 (Conscientiousness).

Individual pro-environmental attitudes and behaviors are expected to guide employee green behaviors (Katz et al., 2022; Stern et al., 1995) and were assessed using seven items that assess environmental affect, eight items that assess environmental cognition, and five items that assess different types of environmental behaviors (BMU, 2019). Cronbach's alpha was 0.83 for environmental affect, 0.77 for environmental cognition, and 0.77 for environmental behavior. In addition, individual endorsement of the New Ecological Paradigm was assessed using the scale proposed by Dunlap et al. (2000). Cronbach's alpha was 0.74.

### Organizational Identification and Organizational Identity Strength

The degree to which individuals perceive themselves as members of an organization is expected to affect their engagement in organizational initiatives (Dick et al., 2007; Jones, 2010). We measured this aspect using six items covering organizational identification (Mael & Ashforth, 1992). Cronbach's alpha was 0.82. We adapted four items covering organizational identity strength (Kreiner & Ashforth, 2004) to the specific context of a climate-friendly university. Cronbach's alpha for this scale was 0.90.

### Post-experimental Measures

In the post-experimental questionnaire, we assessed individual attitudes towards climate protection using two self-developed items that monitor the importance that individuals attach to climate protection and the perceived effectiveness of compensation payments in protecting the climate. To control for social desirability, we included two items measuring the degree to which social norms relating to other participants and relating to the experimenting researchers were perceived (Everett et al., 2015). Last, we included two questions relating to participants' economic condition at the time of the experiment and changes in their economic situation as a consequence of the COVID-19 pandemic.

### Analytic Strategy

We first tested whether the random assignment of participants to the four experimental groups and the control group concerning their sociodemographic characteristics was successful using one-way ANOVAs or a non-parametric Kruskal–Wallis test for mean differences in the case of ordinally scaled characteristics. All tests are two-sided unless indicated otherwise. Based on the descriptive statistics for



the four experimental groups and the control group, we next explored whether the experimental groups differed from the control group using a one-way ANOVA. Next, we used a two-way ANOVA with the factors intervention type and social norm information to test whether the main effects assumed in Hypotheses 1 and 2 were significant. To test Hypothesis 3, we first used planned contrast tests to explore the conditional main effects and clarify which of the four experimental groups differed. Subsequently, we used a planned contrast to test the ordinal interaction we predicted in Hypothesis 3. To correct for multiple testing, we applied an alpha error correction using the Bonferroni method. Last, we tested for possible moderating effects that personal and contextual factors may exert on the results using two-way ANCOVAs including the control variables as covariates and compared the results to the two-way ANOVA used to test the main effects.

## Results

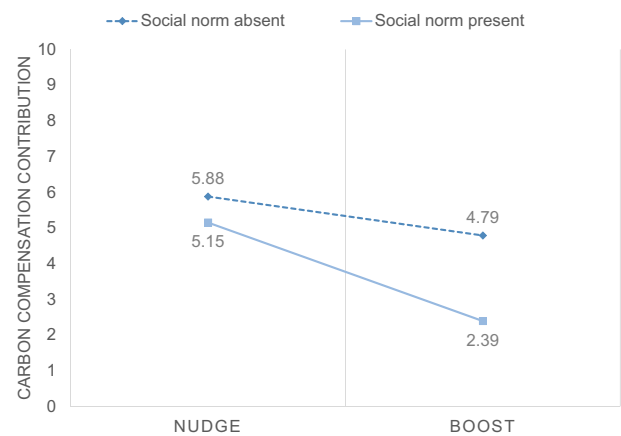
### Descriptive Analysis

Indicating successful random assignment of participants to the conditions, we found no statistically significant differences in Welch-ANOVAs testing for differences in participants' age (Welch's  $F(4, 79.68) = 1.26, p = 0.292$ ), the number of semesters (Welch's  $F(4, 79.77) = 1.23, p = 0.294$ ), and final grade in the highest educational qualification (Welch's  $F(4, 79.15) = 0.20, p = 0.939$ ) across the four experimental groups and the control group. A Kruskal–Wallis test indicated no significant differences across the experimental conditions in participants' gender ( $H(4) = 7.47, p = 0.113$ ).

Table 1 presents the descriptive statistics of experimental results. It shows that participants' mean carbon compensation contributions (CCCs) in the nudge condition (€5.51 or 55.1% of the available amount) exceeded mean contributions in the control (€5.30) and the boost (€3.59) conditions.

**Table 1** Descriptive statistics

Descriptive statistics (N=165)				
Social norm	Intervention type			Total
	Nudge	Boost	Control	
Dependent variable: carbon compensation contribution				
M [SD]				
Social norm absent	5.88 (n=33) [3.91]	4.79 (n=33) [4.27]	5.30 (n=33) [3.88]	5.32 [4.01]
Social norm present	5.15 (n=33) [4.10]	2.39 (n=33) [3.33]		3.77 [3.96]
Total	5.51 [3.99]	3.59 [3.99]		4.70 [4.05]



**Fig. 3** Main effects and interaction of intervention type and social norm information

Moreover, mean CCCs in the absence of social norm information (€5.32) exceeded mean CCCs in the presence of social norm information (€3.77).

Overall, the descriptive statistics reveal that only mean CCCs in the Nudge × Social norm absent condition exceeded mean CCCs in the control group, whereas all other (combinations of) interventions resulted in lower mean CCCs. The descriptive results, therefore, indicate that the impact of a short-term boost was negative, which is contrary to its intention. Figure 3 graphically presents the pattern of results.

Including the four experimental groups and the control group in a one-way ANOVA revealed that there was a significant effect of experimental conditions on CCCs,  $F(4, 160) = 3.92, p = 0.005, \eta^2_p = 0.09$ . Post hoc comparisons of the experimental groups against the control group using Dunnett's  $T$  test (Table A.2 in the Online Appendix, Panel A) showed that only the mean difference between Boost × Social norm present condition and the control group, 2.91, 95% CI [- 5.29, - 0.53], was statistically significant,  $p = 0.011$ .

### Hypothesis Testing

A two-way ANOVA was performed to analyze the effect of the intervention type and the absence or presence of social norm information on participants' CCCs.

Panel A of Table 2 shows that we found a significant main effect of the intervention type,  $F(1, 128) = 7.92, p = 0.006, \eta^2_p = 0.06$ . Accordingly, Hypothesis 1 that stated that nudges are more effective than boosts in fostering CCCs was supported by the results.

The main effect of social norm information on participants' carbon compensation payments was also significant,  $F(1, 128) = 5.21, p = 0.024, \eta^2_p = 0.04$ , supporting Hypothesis

**Table 2** Tests of H1–H3

Tests of H1–H3 ( $N=132$ )						
Source	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p</i>	$\eta_p^2$
<i>Panel A: ANOVA—test of H1 and H2</i>						
Dependent variable: carbon compensation contribution						
Intervention type	1	122.19	122.19	7.92	0.006	0.06
Social norm	1	80.37	80.37	5.21	0.024	0.04
Levene test	3			1.23	0.300	
<i>Panel B: Planned contrast—test of H3</i>						
Intervention type $\times$ social norm	1	223.25	223.25	14.53	<0.001	0.10
Residual	128	1967.15	15.37			

2 that stated that social norm information decreases the effectiveness of both nudges and boosts in fostering CCCs.

To explore where these differences occurred, we used planned contrast tests for comparisons of subgroups with Bonferroni-adjusted  $p$  values (Table A.2 in the Online Appendix, Panel B). First, the difference in CCCs between Nudge and Boost ( $M=2.76$ ) was statistically significant when a social norm was present,  $F(1, 128)=8.16$ ,  $p=0.030$ ,  $\eta_p^2=0.06$ , whereas this difference ( $M=1.09$ ) was statistically insignificant when the social norm was absent,  $F(1, 128)=1.29$ ,  $p=0.260$ . Furthermore, the difference in CCCs between Social norm absent and Social norm present was statistically insignificant in the boost conditions ( $M=2.39$ ),  $F(1, 128)=6.15$ ,  $p=0.087$ , and in the nudge conditions ( $M=0.73$ ),  $F(1, 128)=0.57$ ,  $p=1.000$ .

Hypothesis 3 specifically predicted an ordinal interaction of intervention type and social norm information, stating that the decrease in the effectiveness of interventions induced by the presence of social norm information is stronger for short-term boosts than for default nudges. This predicted ordinal interaction was tested with a planned contrast (Abelson & Prentice, 1997; Buckless & Ravenscroft, 1990) using contrast weights of +1.5 for the Nudge  $\times$  Social norm absent condition, +0.5 for the Nudge  $\times$  Social norm present condition, +0.5 for the Boost  $\times$  Social norm absent condition, and -2.5 for the Boost  $\times$  Social norm present condition. These weights reflect the prediction that the presence of social norm information specifically decreases the effectiveness of short-term boosts, whereas the effectiveness of default nudges is affected to a lesser extent by the presence of social norm information. Further, we assume CCCs in the nudge condition when a social norm is present to correspond to the boost condition when a social norm is absent and therefore chose identical contrast weights for these conditions. Panel B of Table 2 shows that the planned contrast for the interaction effect was significant,  $F(1, 128)=14.53$ ,  $p=0.001$ ,  $\eta_p^2=0.10$ , and thus Hypothesis 3 was supported by the results.

Post hoc power analyses conducted with G\*Power 3.1 (Faul et al., 2007) indicate that an achieved power of

82.14% was reached in the test of H1, 64.34% in the test of H2, and 96.72% in the test of H3. Input parameters of the power analyses were the achieved effect sizes  $f$ , an alpha error probability of 0.05, the sample size of  $n=132$  (excluding the control condition), one numerator degree of freedom, and four groups.

### Additional Analyses and Robustness Checks

To shed light on the influences of personal and contextual factors such as personality traits, pro-social and pro-environmental beliefs, attitudes, and behaviors, an ecological worldview, organizational identification, organizational identity strength, and participants' attitudes towards climate protection, we first analyzed the correlations between the control variables and participants' CCCs. Table A.3 in the Online Appendix shows that positive correlations with CCCs were found for social trust ( $r(163)=0.27$ ,  $p<0.001$ ), environmental affect ( $r(163)=0.35$ ,  $p<0.001$ ), environmental cognition ( $r(163)=0.31$ ,  $p<0.001$ ), and environmental behaviors ( $r(163)=0.40$ ,  $p<0.001$ ), an ecological worldview ( $r(163)=0.26$ ,  $p=0.001$ ), participants' attitudes towards climate protection ( $r(163)=0.40$ ,  $p<0.001$ ), the perceived effectiveness of compensation payments in protecting the climate ( $r(163)=0.36$ ,  $p<0.001$ ), and perceived social norms relating to other participants ( $r(163)=0.21$ ,  $p=0.007$ ).

To further ensure that the reported differences in CCCs were driven by our manipulations, and not by other factors, we first tested if the control variables were distributed equally across the experimental conditions using ANOVAs with the respective control variable as the dependent variable and the experimental condition as a fixed factor. This was the case for all variables listed in Table A.1 in the Online Appendix except for participants' attitudes towards carbon offsetting. We next included the remaining control variables in the ANOVA reported in Table 2 to evaluate conditionally unbiased estimates of treatment

effects (Huiteima, 2011). Generally, the ANCOVA results in Table A.4 in the Online Appendix<sup>2</sup> showed that the inclusion of environmental affect ( $F(1, 128) = 14.55, p < 0.001, \eta^2_p = 0.10$ ), environmental cognition ( $F(1, 128) = 11.54, p = 0.001, \eta^2_p = 0.08$ ), environmental behavior ( $F(1, 128) = 20.24, p < 0.001, \eta^2_p = 0.14$ ), the degree to which participants endorse an ecological worldview ( $F(1, 128) = 9.19, p = 0.003, \eta^2_p = 0.07$ ), and the importance of climate protection ( $F(1, 128) = 22.42, p < 0.001, \eta^2_p = 0.15$ ) resulted in significant influences on CCCs. However, the main effects of intervention type and social norm remained statistically significant at the 5% level in all ANCOVAs, and the effect sizes  $\eta^2_p$  varied between 0.04 and 0.06 for the intervention type ( $\eta^2_p = 0.06$  in the ANOVA) and between 0.03 and 0.05 for social norm information ( $\eta^2_p = 0.04$  in the ANOVA).

Relatively strong and significant influences were associated with pro-environmental attitudes and behaviors, and personal attitudes towards climate protection. To further explore the role of preexisting pro-environmental attitudes and behaviors in the effectiveness of nudging (Ridder et al., 2022), we tested whether the effectiveness of nudging as compared to the control condition is affected by participants' environmental affect, environmental cognition, environmental behavior, and the degree to which they endorse an ecological worldview. To this end, we implemented median splits separating participants with below-median values of these four control variables from participants with above-median values of the control variables for the subsample of participants ( $n = 66$ ) in the nudge and the control conditions. The descriptive results in Panels A–D of Table A.5 in the Online Appendix show that nudging, compared to the control condition, did not affect participants with strong environmental affect and behavior differently than participants with weak manifestations of these characteristics. However, the CCCs of participants with weak (rather than strong) manifestations of environmental cognition and the CCCs of participants with strong (rather than weak) endorsement of an ecological worldview are higher in the nudge than in the control condition. The descriptive results also show that the CCCs of participants with strong environmental affect and behavior are higher than the CCCs of participants with weak environmental affect and behavior, whereas only small differences between the groups with weak versus strong environmental cognition and endorsement of an ecological worldview are found. In line with this, the ANOVAs in Panels E and F of Table A.5 in the Online Appendix show that participants' environmental affect and environmental behavior exerted

significant main effects in explaining participants' CCCs in the nudge and the control conditions, while an interaction with the presence or absence of nudging was not supported.

The degree to which individuals think that offsetting carbon emissions by investing in certified climate protection projects in the Global South is an effective climate protection measure also strongly affected participants' CCCs, but its effect could not be controlled for using an ANCOVA because the independence requirement was not met. Accordingly, no conclusions can be drawn on whether participants' beliefs in carbon compensation as an effective climate protection measure moderate their decisions.

Notably, the assessed behavior did not vary along with any of the dimensions of personality structure assessed using the HEXACO scale. Likewise, organizational identification (Mael & Ashforth, 1992), and organizational identity strength (Kreiner & Ashforth, 2004), did not influence the results. Further, our findings were not affected by the extent to which the participants perceived injunctive social norms relating to the reference group of other participants taking the task and relating to the institutional reference group of researchers who designed the task. Moreover, the results did not reflect significant impacts of participants' monthly budgets and/or changes in their economic conditions during the COVID-19 pandemic.

### Qualitative Analysis of Participants' Reasons for Their Decisions

To further improve our understanding of the determinants of participants' decisions, we conducted a qualitative analysis of the reasons that participants could voluntarily provide to explain their decisions. Previous psychological research identifies perceived individual and social barriers to engaging with climate change (Gifford, 2011; Lorenzoni et al., 2007), whereas empirical research that identifies positive and enabling forces underlying individual engagement with climate change is emerging only recently (Moberg et al., 2021; Thaller et al., 2020). We split the information on participants' reasonings into reasons for not making contributions that referred to participants with below-mean contributions, and reasons for making contributions that referred to participants with above-mean contributions.

Panel A of Table A.6 in the Online Appendix exhibits the results of the qualitative textual analysis of reasonings by participants with below-mean contributions for not making contributions. In line with the previous literature, we found that, among the *individual barriers* to engaging with climate change, a lack of knowledge or limited cognition towards climate change as a complex phenomenon was relevant. Likewise, ideologies and worldviews ("Technosalvation") were documented as individual psychological barriers, along with fatalism: "[My] attitude [is] that

<sup>2</sup> For reasons of brevity, only the results of the ANCOVAs for control variables that exhibit a statistically significant influence on the dependent variable were included in Table A.4.

it makes no difference whether I do [...] something or not because it does not depend on a person.” (Participant 129). Moreover, we found strong evidence of *social barriers* that hindered contributions. Most pertinent were expressions of perceived inequity in mitigation initiatives and worries about others’ free-riding behavior: “I believe that going [...] alone will have little effect on climate change. I am very much willing to limit my life, but only on the condition that other people are COMMITTED to doing the same.” (Participant 119). In addition, a strong emphasis was made on a perceived lack of political action that hinders effective mitigation of climate change: “[...] the compensation of CO<sub>2</sub> should not be based on donations, but should be charged per kilo to the industry. Furthermore, a CO<sub>2</sub> tax should be levied similar to VAT, so that consumption is directly climate neutral” (Participant 100).

Panel B of Table A.6 in the Online Appendix exhibits the reasonings of participants with above-mean contributions. Here, the most pertinent motive was concern about future generations: “I am a family man and I want my children and their children to live in a better world.” (Participant 163). Social norms and expectations regarding others’ significant contributions were rare but occurred, suggesting that they were relevant in substantiating positive contributions, but mostly exerted a negative influence as documented in the experimental results. On the contrary, relatively strong evidence was found for an eco-friendly personal lifestyle and habits, along with the previous experience in making carbon compensation payments to support contributions: “I generally already donate to [compensation provider] as soon as I take a bus or train, live vegan, and get involved.” (Participant 64).

## Discussion

This study aims to explore the potential of behavioral interventions and social norm information to foster individual contributions to decarbonization initiatives in organizational contexts. The experimental results indicate that the effectiveness of both intervention types, default nudges and short-term boosts, is limited in comparison to a control condition. Specifically, contrary to the intention behind them, short-term boosts aiming to improve participants’ decision-making competencies even reduced participants’ contributions in comparison to the control condition. Providing participants with injunctive social norm information reduced contributions to the initiative under both intervention types, whereby the reduction was more pronounced if injunctive social norm information was combined with short-term boosts than with default nudges.

## Theoretical Implications

In contrast with the previous empirical studies that support the effectiveness of default nudges in targeting pro-environmental behaviors (Bruns et al., 2018; Byerly et al., 2018; Everett et al., 2015; Mertens et al., 2022), our findings do not support a significantly positive effect of a default nudge as compared to a control condition in the studied context. Previous research suggests that the effectiveness of nudging may depend on congruence between the direction of the nudging intervention and preexistent preferences (Bronchetti et al., 2013; Ridder et al., 2022; Wijk et al., 2016). Consistent with these findings, our post hoc analysis of the role that participants’ pro-environmental attitudes and behaviors play in determining contributions shows that participants’ CCCs are guided by environmental affect and environmental behaviors performed in other domains. This result suggests that the potential of preexistent preferences and habits in guiding behavior should be taken into account when implementing interventions, as they exert a significant influence, whereas no isolated effect is observed for the nudging intervention in our study.

Moreover, the absence of a significant difference between the Boost  $\times$  Social norm absent and the control condition as well as the reduction in contributions under both intervention types when injunctive social norm information was provided cast further doubt on the effectiveness of behavioral interventions targeting reflective reasoning in the climate context. As we combine these findings with strong qualitative evidence of concerns about an equitable distribution of contributions to mitigating climate change, the results of this study can be interpreted in light of a recently emerging debate on the adequacy of framing climate change as a policy problem in individual rather than systemic terms (Chater & Loewenstein, 2022). Concerns, about whether an emphasis on interventions targeting the individual level might distract policy-makers’ focus away from necessary systemic change in response to the climate emergency, are currently being vigorously debated (Chater & Loewenstein, 2022; Gravert & Shreedhar, 2022; Hagmann et al., 2019). Our results inform this debate by documenting that individual-level reluctance towards behavioral interventions in organizational mitigation initiatives is often associated with the view that alternative policy instruments such as consistent and mandatory carbon pricing would be both fairer and more effective than “soft” behavioral interventions (Schubert, 2017). Accordingly, nudging or boosting voluntary contributions may be inadequate because individuals are facing considerable individual, economic, and infrastructural barriers that inhibit the choice of climate-friendly activities, which is consistent with what has been found for household contexts (Gamma et al., 2020; Moberg et al., 2021). Moreover, experimental findings suggest that



the use of green energy default nudges may even harm as it undermines public support for more costly but also more effective interventions in the form of a carbon tax by providing false hope that severe problems could be solved without substantive policy implementation (Hagmann et al., 2019).

Taken together, these considerations are consistent with our result that combining both intervention types with injunctive social norm information resulted in negative effects on contributions. The potential of social norms appealing to the behaviors of a reference group to create cooperation in mitigation contexts should therefore be further explored. Recent research indicates that descriptive and injunctive social norms exert interactive rather than additive effects (Cialdini & Jacobson, 2021). In the case of misaligned norms, the resulting behavior may be a function of the relative strength of the two types of norms (Bonan et al., 2020). Describing normative trends towards increasing adoption of environmentally friendly behaviors (Cialdini & Jacobson, 2021; Constantino et al., 2022) and emphasizing the prevalence of pro-environmental values and behaviors in a reference group (Bouman et al., 2021b) may turn out to be effective alternatives to using injunctive social norms in isolation. Recent psychological research thereby confirms the view that social norms can be a “double-edged sword” (Gamma et al., 2020) in mitigation contexts where positive examples may be powerful in convincing others to behave in climate-friendly ways, but caution is necessary concerning potential backfiring or boomerang effects (Constantino et al., 2022; Sparkman et al., 2021; Steg, 2023).

Regarding the personal and contextual factors encouraging climate-friendly behaviors in organizational contexts, we found that personal pro-environmental attitudes and behaviors, the degree to which participants endorsed an ecological worldview, and the importance they attached to climate protection were highly relevant in guiding behavior. Comparing these relevant factors against previous literature that finds evidence for the influence of personality traits, an ecological worldview, and sociodemographic factors such as age, gender, and political affiliation on pro-environmental behaviors (Brick & Lewis, 2016; Thaller et al., 2020; Tobler et al., 2012) is difficult due to the high relevance of context. Still, the complex and multi-faceted nature of climate-related behaviors necessitates an in-depth analysis of their antecedents, relevant contextual factors, and potential barriers (Steg & Vlek, 2009).

## Practical Implications

The findings suggest that organizations seeking to implement behavioral interventions to promote decarbonization initiatives should proceed with caution. While nudging turned out to be ineffective compared to no intervention, boosts targeting reflective decision-making processes and

combinations with injunctive norm information had negative effects and thus worked against their underlying intent. Among the most important barriers to choosing a (costly) climate-friendly option, participants in our study named considerations of perceived inequity and disproportionate distribution of costs and benefits. This finding is in line with recent psychological findings on the acceptability of climate policies that critically hinges on the perceived costs and benefits that individuals experience both for themselves and others, and corresponding evaluations of the distributive fairness of climate policies (Steg, 2023).

Subsequent analyses showed that environmental affect and habitual pro-environmental behaviors performed in other domains positively guided individual contributions, indicating an important role of value-led and habitual processes in determining individual engagement that organizations should take into account when designing interventions for climate-friendly behaviors.

We contend that both the motivating forces and potential barriers may critically affect the effectiveness of behavioral interventions in organizations and suggest that these aspects should be explored in more detail through future research. Prospective studies could systematically examine whether combinations of nudges targeting intuitive decision-making with an emphasis on the motivational forces underlying climate-friendly behaviors are more promising. Highlighting an increasing trend in the adoption of climate-friendly behaviors and underscoring the prevalence of pro-environmental values could hold the potential to leverage social norm information in beneficial ways (Bouman et al., 2021b; Constantino et al., 2022), and should therefore also be tested in organizational contexts. In contrast, using reflective interventions such as boosts may foster considerations of fairness and perceived equity that potentially decrease individual willingness to contribute.

## Limitations and Directions for Future Research

Several aspects should be considered when interpreting the findings of this research. First, we intentionally conducted this research with young student participants because we expected (and found) that they highly embrace the importance of climate protection initiatives. This choice translated into relatively low degrees of organizational identification and perceived organizational identity strength, which may be different in other types of organizations. The validity of our results is therefore restricted to understanding millennials' views on how organizational decarbonization initiatives should be configured to motivate support and participation. Accordingly, future research is called for to test the effectiveness of alternative policy interventions in organizational contexts and to extend the findings to other societal groups.



Moreover, we predicted a backfiring effect of injunctive social norm information due to its misalignment with prevailing descriptive norms of others' unsustainable behaviors, but we did not test for the prevalence of this assumption. Accordingly, future research is advised to measure expectations about the prevalence of specific behaviors to enable comparisons between beliefs about a behavior's prevalence in a reference group and its actual prevalence (Constantino et al., 2022). Future research might also investigate settings that involve repeated decision-making situations such as business travel mode decisions to extend our findings on the initial direct effects of the interventions and allow for an evaluation of their long-term effects. Another potentially interesting aspect is to investigate the effects of public visibility of individual and/or aggregate decisions to explore the dynamics resulting from an observable empirical social norm that confounds with injunctive social norm information as implemented here. Finally, it would be fruitful to undertake qualitative investigations into the reasons for (non)conforming to desired organizational behaviors to better understand the factors that need to be altered to foster cooperation in organizational decarbonization initiatives.

## Conclusion

This study illustrates that the effectiveness of behavioral policy interventions to induce individual contributions to organizational climate change mitigation activities is limited and that injunctive social norm information is not suited to positively contribute to this endeavor. Rather, personal affect towards the environment and climate change, as well as habitual pro-environmental behaviors of individuals, are carried into organizations, where they should be positively addressed and promoted. With this insight, the study advocates for the inclusion of the microfoundations of climate-friendly behavior into the organizational context.

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**Data Availability** Data are available from the authors upon request.

**Materials Availability** Materials are available from the authors upon request.

## Declarations

**Conflict of interest** The authors have no relevant financial or non-financial interests to disclose.

**Research Involving Human Participants and/or Animals** The set-up, instructions, and informed consent form of this study were approved by the Experiments lab of Technische Universität Berlin.

**Informed Consent** Written informed consent was obtained from all individual participants included in the study.

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