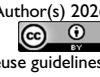
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Belief Traps Hinder Small Business Climate Action

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Abstract

Climate (in)action by small business owners is not driven only by policy or economic considerations but also by sociological and psychological factors, as leaders mimic the behaviors they perceive among their peers. We find that these social inferences about what others believe are often incorrect. In this registered report of 4,432 small-to-medium business owners and leaders across seven countries, we observe a persistent gap between perceived and actual beliefs. And this gap matters: small-to-medium enterprise owners exhibiting a larger gap have fewer sustainability policies in place. These results highlight how peer effects can spur climate action among business leaders.

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Introduction

Small businesses are the backbone of economies worldwide, accounting "for over 99% of firms in OECD (2023a) economies, [and] over 60% of business sector employment." Commensurately, they emit—collectively—vast amounts of greenhouse gases. Recent efforts to measure small-to-medium enterprise (SME) greenhouse gas emissions suggest they account for about half of both UK and OECD (2023b) business emissions (British Business Bank, 2021), 60% in Europe (Constantinos et al., 2010; Muller et al., 2022), or, in Canada, an amount equivalent to the transportation sector (Climate Smart, 2018). Hence, a more expansive understanding of the role of businesses in mitigating and adapting to climate change (Chandy et al., 2023) necessitates investigating the drivers of and barriers to SMEs' climate action.

Research repeatedly finds that many SMEs refrain from taking climate action due to a lack of staff, time, financial capital, "actionable information," and knowledge (Álvarez Jaramillo et al., 2019; Bakos et al., 2020; Hampton et al., 2024; Mole & Ri, 2023). At the same time, SME owners and leaders have few constraints and wide latitude when deciding whether and how to take climate action (Chassé & Courrent, 2018; Jenkins, 2006, Lepoutre & Heene, 2006). Albeit these normative choices are shaped by financial considerations and exogenous constraints, social and psychological influences are important precursors. Values, norms, and beliefs shape how business leaders assess the salience, costs, and benefits of taking action (Amit et al., 2001; Cardon et al., 2009; Murnieks et al., 2020).

In particular, there is evidence to suggest that individuals in all social settings and roles refrain from taking action because they believe that such action is outside the norm for their peer group. This peer-effect dynamic, in which a large number of individuals incorrectly believe that their own beliefs (*first-order beliefs*) are not shared among their peers (*second-order beliefs*, or beliefs about what others believe) is known as a belief trap, perception gap, or pluralistic ignorance (Bicchieri, 2016; Miller, 2023). As regard to climate change, individuals erroneously and systematically underestimate the extent to which peers care about the topic. Belief traps have been observed across different populations in a variety of climate domains, including energy conservation, policy support, and belief in climate change (Andre et al., 2024; Jachimowicz et al., 2018; Leviston et al., 2013; Sparkman et al., 2022), and in other social domains (for reviews see: Bursztyn & Yang, 2022; Lees & Cikara, 2021; Sargent & Newman, 2021). Yet, although belief traps have been acknowledged in the wider literature on general attitudes held by average citizens, their role in shaping SMEs' engagement with organizational climate action has not received attention.

The role of belief traps and peer effects in organizational decision-making on climate is particularly important because, in this regard, SMEs are unlike large, established corporations (Audretsch et al., 2015). Although multinational corporations are under regulatory and investor pressure to account for, disclose, and reduce their environmental impacts (Unter et al., 2024), SMEs face less policy pressure. And notwithstanding some high-profile or cost-driven exceptions, for most SMEs there is no compelling economic case for taking substantial climate action (Berchicci & King, 2022; Kaplan, 2020). Consequently few small businesses pursue far-reaching voluntary activities. Yet, because of their

organizational attributes (size, age, ownership), behavior (identifying and exploiting opportunities; Shane & Venkataraman, 2000), and performance (innovative and growing; Audretsch et al., 2015), SMEs can pursue entrepreneurial opportunities that some describe as "taking responsibility" vis-à-vis stakeholders (Bosse et al., 2023). Despite significant resource constraints and uncertain financial consequences, some SMEs do take action on climate change (Soundararajan et al., 2018).

In this study, we employ a theory elaboration approach (Fisher & Aguinis, 2017) to assess whether socio-psychological theory that predicts individual behavior is generalizable to organizational behavior and entrepreneurial leadership around climate action. We pursue this theory elaboration via two distinct channels. The first is horizontal contrast, that is, whether an existing theoretical insight in one context fits in a different context (Fisher & Aguinis, 2017, p. 444). The second is vertical contrast, that is, whether theory developed to explain constructs and relations at one level of analysis can describe constructs and relations at another level (Fisher & Aguinis, 2017, p. 446). We first contrast climate belief trap theory horizontally by assessing whether belief traps actually exist among SME owners and leaders across international boundaries, as current theory is derived mostly from data on the general populace in the United States and their beliefs about personal behaviors or public policy. We also contrast climate belief trap theory vertically by investigating the effects of belief traps on climate policies undertaken by organizations, as existing theory is derived mostly from data on individuals acting in isolation and largely in voting or one-off consumption contexts. By elaborating theory via horizontal and vertical contrasting, we establish the greater generalizability of climate belief theory and its explanatory value for concrete action toward organizational sustainability.

Empirically, we draw on a large multinational survey from countries with varying levels of stringency in environmental policy and different ideologies regarding climate change. Specifically, we assess the gap between stated personal and inferred collective beliefs about climate action among small business owners and leaders, and then the relationship between this belief trap and SME owners and leaders' climate (in)action, in a large-*n*, international sample spanning eight countries. We hypothesize that SME owners' and leaders' beliefs about the importance of taking climate action will be higher than perceived prescriptive norms: how much they think other SME owners and leaders think taking climate action is important (Hypothesis 1). We hypothesize that SME owners and leaders' perceived prescriptive norms will positively predict their behavioral intentions (Hypothesis 2a) and the number of sustainability policies they have in place (Hypothesis 2b). We also explore nine factors, five at the organizational level and four at the individual level, as possible exploratory moderators of the predicted relationships in Hypotheses 2a and 2b (Exploratory Questions 3–11). Our results strongly support Hypotheses 1 and 2a and 2b, and find that organizational size, country, ideology, and premise ownership moderate the effect of second-order beliefs on behavioral intentions and policy adoption.

Our study makes three primary contributions. First, we distinguish between *prescriptive* norms (sometimes called "injunctive" norms), what *ought* to be done and what is considered right and wrong, from *descriptive* norms, what *is* being done and what is considered typical and normal. This "ought versus is" (prescriptive vs. descriptive) distinction has long been acknowledged in psychological theory (Cialdini et al., 1991; Gelfand et al., 2024) but remains unexamined in entrepreneurship research on peer-effects, which focuses largely on descriptive norms (for a discussion of norm theory in entrepreneurial peer-effects, see Portyanko et al., 2023). Our contribution lies in our focus on prescriptive norms, as the role of these norms in SME decision-making have yet to be isolated from the role of descriptive

norms, and a growing body of work suggests prescriptive norms play a unique, and often more impactful, role compared to descriptive norms in driving energy conserving behaviors (Bonan et al., 2020; Jachimowicz et al., 2018; Rhodes et al., 2020).

Our second contribution is that we generalize climate belief trap theory both horizontally, from citizens and consumers to SME owners and leaders, and vertically, from the interpersonal context to the business decision-making context. While a large body of work exists on climate-related behaviors and social norms, it is frequently acontextual, lacking a multi-level perspective, and divorced from realistic public policy and organizational objectives (Constantino et al., 2022; Gelfand et al., 2024; González, 2024). Generalizing past work to the context of SME leadership informs both belief trap theory and organizational scholarship. Lastly, our third contribution is to examine the multi-level boundary conditions under which beliefs about peers actually matter for SME climate action.

Theory

Peer Effects in Entrepreneurial Decision-Making. In this study, we examine whether the existence and influence of salient "peer effects" shapes SMEs' perceptions and behavior in the domain of climate action. Peer effects, especially as a form of social learning (Jibril et al., 2022), have been studied widely in different contexts including students (Paloyo, 2020), employees (Chan et al., 2014), and firms (Kelchtermans et al., 2020). Peers are typically defined as "those individuals in the immediate social context of similar rank and similar attributes to the focal individual" (Tartari et al., 2014, p. 1190). In research on entrepreneurship, there is growing evidence of the impact of peer effects. Examples include Galloway et al. (2021) who provide evidence that entrepreneurs seek out and prioritize practical advice from direct competitors that they deem as competent. Similarly, Oehme and Bort (2015) showed that SMEs are heavily influenced by their peers, typically members of their business networks, when mimicking decisions whether to internationalize. Peer effects have been studied particularly in pre-formation, formation, and early growth stages of entrepreneurial ventures (Greenberg, 2021; Hasan & Koning, 2019; Markussen & Røed, 2017). For instance, Portyanko et al.'s (2023) systematic literature review identified three causal mechanisms for peer effects among entrepreneurs: *information acquisition and assessment; approval and alignment among peers; and maintenance of an entrepreneurial self-concept*.

This corpus, however, focuses primarily on individual-level settings where peer effects are largely driven by interpersonal descriptive norms of what immediate peers are doing, and where competition and performance are critical outcomes. Yet, peer effects can be varied and need not be overly circumscribed. "Past research on peer influence has suggested that peer influence can occur without direct interactions among group members…Thus, peer groups should not be narrowly defined by direct interactions between group members but rather a group of people whom the focal individual may perceive as a reference group for their own choices" (Qin et al., 2022, p. 98). And, while mimicry forms an essential organizational response to maintaining legitimacy in the face of stakeholder pressures among large corporations (Suchman, 1995), little is known about how positive prescriptive peer effects, such as concern for climate change in business, might apply at the level of SMEs, as opposed to individuals in the general population (Westman et al., 2023). Accordingly, there is a need for examining to what extent SME owners and leaders are influenced by peer groups, and via what prescriptive norm mechanism(s), which motivated our examination of entrepreneurial status as a moderator of the belief trap (Exploratory Question 3, see

Hypothesis section). It is plausible that entrepreneurial firms will mimic peers more as they grow their company (Galloway et al., 2021; Qin et al., 2022), in which case entrepreneurial status may accentuate the hypothesized relationship between prescriptive norms and behavior. Conversely, entrepreneurial leaders are motivated to differentiate (Lortie et al., 2021; Zehir et al., 2015), and entrepreneurial peer effects can drive creativity (Bellò et al., 2018), suggesting entrepreneurial leaders may be precisely the group motivated to mimic peers *less* than leaders in established SMEs. In this case, entrepreneurial status may serve as a boundary condition where Hypotheses 2a and 2b are attenuated or not observed. It is this uncertainty that led us to examine entrepreneurial status as an exploratory moderator.

Existing Evidence for Climate Change Belief Traps. At the individual level, decisions to take action on climate change are driven by a variety of factors, including knowledge and awareness, education, demographics, perceptions such as climate experience and exposure, personal beliefs, identities, emotions, values, concern, and personal responsibility (Bouman et al., 2020; Bleda & Pinkse, 2023; Gatersleben et al., 2014; Weber, 2010). Thus, understanding human behavior generally (Hackmann et al., 2014), and specifically the effects of beliefs, mimicry and contagion, is critical for deciphering the norms and behavioral patterns that ultimately determine climate emissions (Carrico et al., 2015; ; Constantino et al., 2022; Gillingham & Bollinger, 2021). These "[b]eliefs can be highly resilient in the sense that they are not easily abandoned in the face of counterevidence" (Scheffer et al., 2022, p. 1), and so learning more about belief formation is crucial for overcoming climate inaction.

A large body of research has consistently demonstrated that misperceptions of climate-related norms (prescriptive and descriptive) persist in the population and are tied to individuals' own behaviors and attitudes. Individuals' beliefs about taking pro-environmental action are not driven solely by their own motives and values about the environment (Amengual & Apfelbaum, 2021), they are heavily influenced by beliefs about the behavior of others (Andre et al., 2024; Cole et al., 2022; Jachimowicz et al., 2018; Nyborg et al., 2016). Often, such beliefs are formed without accurate knowledge of others' beliefs, resulting in pluralistic ignorance—"shared false ideas of individuals about the sentiments, thoughts, and actions of others" (Miller, 2023; O'Gorman, 1986, p. 333, Sargent & Newman; 2021). Usually, these beliefs are biased downwards, and "people structurally underestimate how much others care" (Bouman & Steg, 2019, p. 27) about environmental issues. Sparkman et al. (2022), for instance, found that a majority of Americans widely underestimate public support for climate change policies, and Stone and Lees (2024) found the same pattern in perceived public support for corporate net carbon neutral pledges. Similarly, studies in Australia (Leviston et al., 2013) and China (Mildenberger & Tingley, 2019) reveal that people in these countries overestimate the tendency of others to deny the existence of climate change. This evidence for climate-related belief traps across populations and contexts is the basis for our hypothesis that SME owners and leaders will exhibit similar misperceptions (Hypothesis 1). Such downwardly biased second-order beliefs (beliefs about others' beliefs), or "belief traps" (Bicchieri, 2016), shape public climate policy debates and can hinder or block collective climate action. Conversely, Jachimovicz et al. (2018) found that positive second-order beliefs about energy saving among members of US communities *promoted* energy conservation. Accurate second-order beliefs can thus be a powerful mechanism for changing social norms and preferences (Bicchieri, 2016; Constantino et al., 2022; Doherty & Webler, 2016), which in turn influences climate action beyond perceived costs versus benefits. This work on the relationship between stronger perceived norms and more norm-aligned behaviors in the general populace informed

Hypotheses 2a and 2b that SME owners' and leaders' belief traps will be tied to their behavior.

Notably, the vast majority of research on belief traps and climate change has been conducted on average individuals in the general population, as citizens and consumers of media. As such, whether these patterns of climate-related belief traps are applicable to decision-makers in organizations and across countries (a matter of horizontal contrasting), let alone whether such belief traps predict business behavior (a matter of vertical contrasting), are open questions. Answering these questions will advance our understanding of both organizational decision-making and belief traps as socially embedded phenomena.

Peer effects, SME Belief Traps, and Business (In)action. Our prediction that SME owners and leaders will underestimate support for climate action among other SME owners and leaders is supported by core theories of pluralistic ignorance. A central theoretical mechanism driving the pluralistic ignorance phenomenon is low mutual observability within a peer group (Miller, 2023): when individuals are unable to observe a representative set of attitudes and behaviors, they are likely to form inaccurate second-order beliefs that underestimate both the prevalence of behaviors (descriptive norms) and the strength of prescriptive norms.

We argue that the structural nature of SME peer groups, and the nature of sustainability attitudes and behaviors within SME peer groups, coheres with the theoretical account of a low mutually observable social context, and therefore the belief trap we predict will be present. First, many sustainable business practices are relatively unobservable from outside the organization, including purchasing power from renewable sources, reducing energy consumption, net-zero supply chain policies, and employee sustainable travel incentives. Second, even for the sustainable behaviors which are relatively visible, for example installing solar panels on company property or promoting "green" products to customers, the significant cost and expert knowledge often needed (perceived and real) for implementing such policies (Pacheco et al., 2010; Roberts et al., 2006; Simpson et al., 2004) can create a significant lag in time between the development of pro-sustainability attitudes and the observable actions those attitudes enable, furthering the issue of low mutual observability.

Third, existing work on SME owners' and leaders' peer groups suggests they are unlikely to be representative, and unlikely to induce individuals to express their privately held beliefs about sustainability. The peer groups of SME owners and leaders are highly local and industry specific (Peltier & Naidu, 2012), depriving SME owners and leaders of the broader sets of norms held across industries and locations that leaders of larger firms have access to, thereby exacerbating the issue of low mutual observability. Similarly, the regulatory and public focus on business sustainability has understandably been directed to larger firms, making climate action an issue of lower salience for SME owners and leaders (Crawley et al., 2020; Uhlaner et al., 2012; Waldman et al., 2019). Combined with the fact that many perceive a lack of a business case for sustainability policies (Kaplan, 2020), we predict that pro-sustainability attitudes are less likely to diffuse through the peer groups of SME owners and leaders, further reducing mutual observability.

Of course, the size and impact of climate belief traps in business settings may be enhanced or attenuated by contextual conditions. Prior research has demonstrated that individual political and ideological covariates have an effect (Mildenberger & Tingley, 2019). This is likely to be true for SME owners and leaders, but additional moderators may also be salient, such as their perception of the costs of climate-related efforts. Organizational-level factors may also be relevant, including where the company is located

and whether it is an entrepreneurial venture. Given that SME owners and leaders have almost unlimited agency to incorporate the climate practices they desire in the businesses they run (Del Giudice et al., 2017; Luederitz et al., 2021), greater insight into the contextual factors that moderate belief traps can help design interventions customized to specific target audiences.

Methods

Hypotheses

Our study design investigates two sets of hypotheses, and a series of exploratory questions regarding moderators and boundary conditions. The first hypothesis (H1) pertains to the existence of belief traps about climate among SME owners and leaders. The second set of hypotheses (H2a and H2b) test whether these belief traps are associated with climate-oriented behavioral intentions and actions. Hypotheses 1 and 2 are confirmatory hypotheses. We also investigate a series of exploratory questions (EQ3–11) testing whether the relationships between the belief trap and climate-oriented behavioral intentions and actions is contingent on contextual organizational and psychological factors.

The Belief Trap Hypothesis (H1): One's own belief about the importance of taking climate action [CA_{own}] is greater than one's perceived prescriptive norms among SME owners and leaders about the importance of taking climate action [$CA_{prescrp_norm}$]. H1 is tested using a two-tailed paired *t*-test. We predicted that mean[CA_{own}] $>$ mean [$CA_{prescrp_norm}$]. The null hypothesis is that mean [CA_{own}] $\leqslant$ mean [$CA_{prescrp_norm}$].

The Belief Trap Matters Hypotheses (H2a and H2b): One's perceived prescriptive norms among SME owners and leaders about the importance of taking climate action [$CA_{prescrp_norm}$] is positively associated with one's pro-environmental organizational behavioral intentions [BI_{own}] (H2a) and positively associated with the number of sustainability policies in place at one's organization [SP_{org}] (H2b), all controlling for one's own belief about the importance of taking climate action [CA_{own}]. We control for one's own beliefs in all models examining the relationship between second-order beliefs and behaviors/attitudes to address the well-documented phenomenon of individuals projecting their own beliefs outward when making second-order judgments (Krueger & Clement, 1994). Failing to account for first-order beliefs when studying second-order beliefs can upwardly bias estimates of how much second-order beliefs relate to behavior (Haack & Sieweke, 2020; West & Kenny, 2011). H2a and H2b are therefore tested using moderated regression models, as they overcome known issues with calculating mere difference scores and correlating them with outcome variables (Barranti et al., 2017).

Exploratory Questions (EQ3–11): What factors moderate the hypothesized positive linear relationship between one's perceived prescriptive norms among SME owners and leaders about the importance of taking climate action [$CA_{prescrp_norm}$] and behavioral intentions [BI_{own}] (H2a) and policies in place at one's organization [SP_{org}] (H2b)? We examine nine factors, five at the organizational level, and four at the individual level. Analyses of potential moderators and boundary conditions are exploratory with no a priori predictions.

Organization-Level Moderators

- Entrepreneurial Status [$Entrepreneur_i$] (EQ3): Will the associations between [$CA_{prescrp_norm}$] and both [BI_{own}] and [SP_{org}] differ for entrepreneurial versus non-entrepreneurial companies. Unlike all other exploratory moderation analyses, entrepreneurial status is operationalized as a set of conditions across multiple variables,

namely any respondent from a company that is *both* less than 5 years old *and* has less than 50 employees (Ahmad & Seymour, 2008). Any company that did not meet both conditions is coded as non-entrepreneurial.
- Company size [$Size_i$] (EQ4): Will the associations between [$CA_{prescrp_norm}$] and both [BI_{own}] and [SP_{org}] differ for larger and smaller companies?
- Whether a company owns its premises [$Own_Premises_i$] (EQ5): Will the associations between [$CA_{prescrp_norm}$] and both [BI_{own}] and [SP_{org}] differ for companies that own their own premises versus rent?
- Country [*Country*] (EQ6): Will the associations between [$CA_{prescrp_norm}$] and both [BI_{own}] and [SP_{org}] differ by country?
- Age of the organization [$OrgAge_i$] (EQ7): Will the associations between [$CA_{prescrp_norm}$] and both [BI_{own}] and [SP_{org}] differ by the age of the organization?

Individual-Level Moderators

- Left-Right Ideology [$Ideology_i$] (EQ8):Will the associations between [$CA_{prescrp_norm}$] and both [BI_{own}] and [SP_{org}] differ by SME owners, and leaders' political ideology?
- Peer interaction frequency [$InteractFreq_i$] (EQ9): Will the associations between [$CA_{prescrp_norm}$] and both [BI_{own}] and [SP_{org}] differ by SME owners' and leaders' levels of peer interaction frequency?
- Cost Concerns [$Cost_i$] (EQ10): Will the associations between [$CA_{prescrp_norm}$] and both [BI_{own}] and [SP_{org}] differ by SME owners' and leaders' concerns over the cost of pro-environmental company policies?
- Owner/Leader Age [Age_i] (EQ11): Will the associations between [$CA_{prescrp_norm}$] and both [BI_{own}] and [SP_{org}] differ by SME owners' and leaders' age?

Analysis Plan

Supplemental Tables 3.2 and 3.3 summarize all the hypotheses/exploratory questions and their accompanying analyses. Equation 1 expresses the form of the moderated regression models that were used to test H2a and H2b, and Equation 2 expresses the form of the moderated regression models that were used to examine EQ3–11. All models testing H2 and EQ3–11 include as fixed-effect predictors all examined moderators (sans peer interaction frequency, see below, and entrepreneurial status, as it is a subset of other moderator variables), denoted with m coefficients, and the following control variables, denoted with c coefficients: gender [*Gender*], education [*Edu*], company industry [*Industry*]. Gender and education are included as controls because they were associated with behavioral intentions and/or the policy count in the pilot data. Industry is included for theoretical reasons, namely that industry determines to a large extent the context and capacity of SMEs to implement discrete sustainability policies. Note that peer interaction frequency [$InteractFreq_i$] is not included as a standing fixed-effect in Equations 1 and 2. Peer interaction frequency is theorized as a possible mechanism of pluralistic ignorance (Miller, 2023), as such including it as a fixed-effect, while testing Hypothesis 2 and all other exploratory questions may confound the relationship between perceived prescriptive norms and behavioral intentions/policy adoption. Peer interaction frequency is only be modelled as a moderator (a la Equation 2) in testing EQ9. Due to concerns over undue use of control variables in organizational research (Becker et al., 2016; Bernerth & Aguinis, 2016), all the

stated hypotheses and exploratory questions are tested and reported without any accompanying secondary control [*c*] or moderator [*m*] variables.

Equations

$$[BI_{own} \mid SP_{org}] = b_1CA_{own} + b_2CA_{prescrp_norm} + b_3CA_{own} : CA_{prescrp_norm} + m_1Size_i + m_2Own_Premises_i + m_3Country + m_4OrgAge_i + m_5Ideology_i + m_6Cost_i + m_7Age_i + c_1Gender_i + c_2Edu_i + c_3Industry + e_i \quad (1)$$

$$[BI_{own} \mid SP_{org}] = b_{1-8}CA_{own} \times CA_{prescrp_norm} \times [Moderator_i] + m_1Size_i + m_2Own_Premises_i + m_3Country + m_4OrgAge_i + m_5Ideology_i + m_6Cost_i + m_7Age_i + c_1Gender_i + c_2Edu_i + c_3Industry_i + e_i \quad (2)$$

Descriptive statistics for all responses for all countries are reported, as is descriptive information regarding how many participants displayed a belief trap. Participant responses were not included in analyses if they failed an attention check (see Supplemental materials), otherwise all analyses use pairwise deletion of incomplete data. Hypothesis 1 is tested using a two-tailed paired sample *t*-test. Cohen's *d* is computed using the pooled standard deviation. Hypothesis 2 and Exploratory Questions 3 to 11 are tested using multiple linear regressions, reflected in Equations 1 and 2 respectively. Exploratory Questions 3 to 11 are tested by modelling three-way interactions between each moderator, one's own beliefs, and the perceived beliefs of others, each in a separate model. EQ3–11 are each tested using *F*-tests for statistically significant interactions. Exploratory analyses of what factors predict a larger or smaller belief trap use a Truth and Bias (West & Kenny, 2011) regression framework, where second-order beliefs are regressed onto first-order beliefs, the factor of interest, and their interaction, along with a control for country (see online R code https://osf.io/32eph/files/fy63m for an example of this approach). This approach overcomes known issues of correlating difference scores (Barranti et al., 2017). The *p*-value cutoff for statistical significance for any and all exploratory analyses, including those examining Exploratory Questions 3 to 11, was lowered to 0.01, to reduce concerns over false positive results in exploratory analyses. Variables in the multiple regressions are *z*-scored by default (unless an analysis requires raw values to interpret), and in doing so 'participants' own attitudes and perceived others' attitudes are divided by their pooled standard deviation. In addition to being *z*-scored, the policies-in-place-dependent variable is also reported untransformed, as these count data have inherent and interpretable meaning in raw form.

In instances of a statistically significant interaction between one's own and perceived others' attitudes, two sets of marginal effects contrasts (Busenbark et al., 2022) are examined. First, marginal slopes are computed for perceived others' attitudes and the dependent variable at $\pm$ 1 standard deviations of own attitudes. Second, four theoretically relevant marginal mean contrasts are computed, and for each a marginal slope for the association between perceived others' attitudes and the dependent variable are computed. These contrasts capture own and perceived other beliefs at high/high, low/low, low/high, and high/low levels. "High" and "low" are operationalized at $\pm$ 1 scale point from the median response to the own attitudes item. If (for example) the median own attitude response is 7, then high values for own and perceived other attitudes is 8, and low values 6, across all contrasts. This allows us to examine the relationship between second-order beliefs and

behavior for SME owners and leaders who exhibit the belief trap (high/low), while also separating out those who do not exhibit the belief trap into theoretically relevant groups (high/high, low/low, low/high).

Additional planned robustness checks, and heuristics for dealing with unanticipated analysis issues, are detailed in Supplemental Section 2: Further Methodological and Analysis Plans.

Ethics Information

All participants provided informed consent to participate in the survey. As per the specific regulations in each country of data collection, the lead researchers in all participating institutions obtained necessary approvals from the respective ethics/institutional review board of their home institutions. Details on the incentives used in each Country can be found in Supplemental Table 3.1. This study involved no deception or incomplete disclosure.

Pilot Data

Pilot data were collected in the United States, Germany/Austria, and Italy, and combined for analysis. The final sample was $N = 529$. These pilot data served multiple purposes. First, they provided initial support for our stated hypotheses, namely H1, H2a, and H2b. Second, they demonstrated translatability of the survey across languages. Third, they informed the prospective power analyses by providing effect sizes estimates. Fourth, they informed planned sampling strategies by providing estimates of the percentage of participants who will meet SME owner/leader criteria. Fifth, they allowed for methodological iteration of the measurement of the climate actions an organization is currently engaged in, a key dependent variable.

Design

Procedure. The following describes the default, master survey provided to all teams (plain survey language can be found here: OSF Link https://osf.io/kj5wt/files/zjg6m). Small variations occurred across teams as necessary based on the nature of the survey deployment (e.g., managed survey panels used their own standard attention check versus the one in the master survey).

After providing informed consent, participants were asked whether they are an "Owner, Co-Owner, or CEO," or "Managing Director or Senior Lead" of an SME (which we label a "small-to medium-business (SMB)" to use more colloquial language), which was defined for participants as a company with 2 to 250 employees. Participants who did not indicate they are owners and leaders in an SME (who instead select "I am part of an SMB but not in a senior position" or "I am not part of an SMB") are not included in any analyses. Next, participants were administered an attention check asking them to select "strongly agree" in the response options. Participants who failed the attention check are not included in any analyses.

Participants were then directed to an instruction screen which provided them with a simple definition of climate change. On the following page participants responded to the *Own Attitude* item asking "In your opinion, how important is it for YOUR business to act on climate change?," then on the next page responded to the *Others' Attitude* item asking "Think about the average leader in a small-to-medium business like yourself: How much do THEY believe it is important for THEIR business to act on climate change?" Both items were measured using a

0 to 10 sliding Likert scale anchored on "Not at all Important" to "Extremely Important." On the next survey page, participants responded to *two behavioral intention items*,[1] presented in random order, "How willing are you to lead pro-environmental company strategies for your organisation?" and "How willing are you to advocate for pro-environmental company policies to your coworkers?." Both were measured using a 0 to 10 sliding Likert scale anchored on "Not at all Willing" to "Extremely Willing."

On the next page, participants saw a list of the nine labelled categories of climate actions, presented in random order. At the top of the page, it read "Does your organization engage in any of the following climate actions?" The categories were: Energy efficiency, Use of renewable energy sources, Workflow improvements, Climate friendly premises, Climate friendly transport/reduction for you and/or your employees, Climate friendly products and services for your customers, Green purchasing/food consumption, Climate outreach, and Awareness-raising among employees. Each label was accompanied by a list of example actions exemplifying the category (e.g., "Energy efficiency" gives "smart buildings, reduced consumption of heating and cooling" as example action). For each category of action, participants were given four response options: "Yes, as a deliberate strategy," "Yes, but not as a deliberate strategy," "No," and "I don't know" (Uhlaner et al., 2012).

On the next page participants were asked "How frequently do you interact with leaders from other small-to-medium businesses?," with five response options: never, once in a while, sometimes, frequently, very frequently (adapted from Peltier & Naidu, 2012), as a measure of peer interaction frequency. Participants were then asked "In general, how concerned are you about the financial cost of pursuing pro-environmental company policies?," measured using a 0 to 10 sliding Likert scale anchored on "Not at all Concerned" to "Extremely Concerned." On the subsequent page, participants were asked the following questions about their business: its industry (13 options), how many people it employs (three bracket options), whether it has a physical office and whether said office is rented or owned, and how old is the organization (five bracket options). On the following page, participants were asked for their gender (Male, Female, or Non-binary/third gender/unlisted [open text box]), their age (five bracket options), their level of education (seven options), and their ideology, measured with the item "In political matters, people talk of 'the left' and 'the right.' How would you place your views on this scale, generally speaking?' (Haerpfer et al., 2020) along a 1 to 10 scale anchored on "Left" (1) and "Right" (10). Lastly, participants were provided the opportunity to leave an open comment before the survey ended[2].

All surveys administered in German, French, or Italian were translated in a five step process (Brislin, 1970). First, they were translated from English to their respective language by a member of the research team (forward translation). Second, they were back-translated into English by a second individual who was unfamiliar with the research project. Third, a comparative review of the original and back translated English versions was conducted by a member of the research team who was not involved in the forward translation. If there were discrepancies, the comparative reviewer and forward translator discussed and tried to resolve the source of the translation issue. Fifth, the resolution was then presented to the back translator for comment, further revision if needed, and ultimately agreement between all three translators.

Sampling Plan. Participants: Sampling was carried out across eight countries (Austria, Canada, France, Germany, Ireland, Italy, United Kingdom, and the United States) that were chosen to avoid reliance on a single market and policy context and thus to enable

insights into potential variation across different jurisdiction and socio-cultural contexts. Yet as members of the OECD these countries are all also relatively homogenous enough to ensure sufficient comparability versus other economic contexts and geographies in which the nature of SMEs may be significantly different. The method of sample recruitment varied by country, given the difficulty and constraints associated with collecting samples of SME owners and leaders, and the unique research contexts of each country.

Supplemental Table 3.1 contains information about planned data collection in each country. In order to be included in the final dataset, participants must have identified as an owner/leader in a small-to-medium enterprise. In the base survey, this was screened at the beginning of the survey with a question asking whether participants are the "Owner, Co-Owner, or CEO," or a "Managing Director or Senior Lead," in an SMB. In surveys fielded by YouGov, screening was based on a YouGov prescreen question asking if participants occupy one of the following positions in an SMB: Owner/Proprietor, Partner, Chairperson, Chief Executive, Managing Director, Non-Executive Director, Other board level manager/director, or Other senior manager or director below board level. Participants who did not identify in the manners specified above as an owner/leader of an SME are not included in any analyses. YouGov recruited SME owners and leaders via its "Business-to-Business Omnibus" panel, which targets a representative set of respondents based on organizational size and region.

Given the variance in sampling methods across countries, and uncertainty regarding the precise number of participants each country team would be able to collect, we used a set of sampling rules and heuristics, depending on the sampling method, to guide data collection. These heuristics were developed to guide each team's precommitment to data collection, and minimize the need for post hoc decision-making on the part of team members contending with the unique sampling circumstances of their country. The heuristics/rules pertain to the minimal sample size per country, the sampling time frame, sampling via third-party recruitment, sampling via online personal network recruitment, sampling for in-person recruitment, statistical power, and exclusion criteria. The details of these sampling heuristics can be found in Supplemental Section 2: Further Methodological and Analysis Plans.

Data Availability. All open materials associated with this manuscript can be found on the OSF here: https://osf.io/6ukx2/. This includes (a) a copy of the accepted Stage 1 manuscript, which serves as a copy of the preregistration, (b) all materials associated with the original submission of the Stage 1 manuscript (namely, pilot data and analyses, (c) updated and translated copies of all final survey language, and (d) copies of the raw data and R analysis code used to generate the results herein.

Results

Summary Statistics

We collected a final sample (after preregistered exclusions) of $N = 4{,}432$ SME owners and leaders. Table 1 details the achieved samples by country, Table 2 contains the descriptive statistics for the organization-level variables, and Table 3 details the summary statistics and correlations for all numeric measures.

Table 1. Final Samples.

Country of data collection	Target sample size	Final sample (after exclusions)	% of final sample	Planned recruitment method	Notes/deviations from preregistration
Austria	238	36	N.A	Email through intermediaries at the Austrian economic chamber	$N = 36$ does not reach the preregistered minimum of $N = 50$, therefore Austrian data is not included in the results herein
Canada	250	251	5.66	YouGov panel	
France	250	257	5.80	YouGov panel	
Germany	475	480	10.83	Online panel	
Ireland	600	533	12.03	Email through the two largest SME networks in the country	Deviation from preregistration: After slow email uptake, recruitment was expanded to professional survey panel providers Amarach, Norstat, and Strat7 ($N = 60$ via email, $N = 106$ via Amarach, $N = 141$ via Norstat, $N = 226$ via Strat7)
Italy	119	60	1.35	In-person and online through personal and professional networks and associations	
United Kingdom	1,000	2,038	45.98	YouGov panel	Deviation from preregistration: Funding became available shortly before data collection to collect $N = 2,000$ in the UK. This funding required data collection in the UK and as such wasn't sharable with other teams.
United States	475	813	18.34	Prolific and Forthright panels	Deviation from preregistration: Some data collection occurred shortly after the preregistered deadline to cease collection due to administrative delays in the IRB approval and release of funding ($N = 326$ via Prolific, $N = 487$ via Forthright).
Total	3,407	4,468 (4,432[a] used)			

Note. Details on deviations from the preregistration can be found in Supplemental Material Section 5.

[a]Pairwise deletion was the preregistered method of handling incomplete data. Due to some participants choosing to not respond to exploratory/control variable questions, "full" models with all such variables have a final $N \sim 4,177$.

Table 2. Organizational Descriptives.

Industry	*N*	%	Org size	*N*	%	Org age	*N*	%	Org premises	*N*	%
Finance and accounting	356	8.09	Micro (2–9)	1,844	41.91	0–5Y	616	14.13	Offices owned	2,178	49.49
Construction	439	9.98	Small (10–50)	1,239	28.16	5–10Y	880	20.18	Offices rented	1,395	31.70
Education	172	3.91	Medium (50–250)	1,317	29.93	10–20Y	1,201	27.55	Ownership unknown	139	3.16
Hospitality	276	6.27				20–30Y	897	20.57	Online only	551	12.52
IT	550	12.50				30+Y	766	17.57	Other	138	3.14
Legal	95	2.16									
Manufacturing	456	10.36									
Media and marketing	282	6.41									
Medical	232	5.27									
Other	736	16.72									
Real estate	139	3.16									
Retail	525	11.93									
Transportation	143	3.25									

Table 3. Primary Variables.

	Descriptive statistics					Correlations								
Variable	Mean	*SD*	Min	Median	Max	Own Att.	Prescr. Norms	Beh. Intent	Policy count (All)	Policy count (NonD)	Policy count (Del.)	Peer Inter. Freq.	Left right ideol.	Cost conc.
Own Attitude	5.69	3.17	0.00	6.00	10.00	1	.	.	.	.	.	.	.	.
Prescriptive norms	5.21	2.83	0.00	5.00	10.00	.78	1	.	.	.	.	.	.	.
Behavioral intent	5.94	3.19	0.00	7.00	10.00	.81	.69	1	.	.	.	.	.	.
Policy count (All)	5.36	3.04	0.00	6.00	9.00	.64	.60	.64	1	.	.	.	.	.
Policy Count (Non-Deli)	2.49	2.17	0.00	2.00	9.00	.12	.14	.12	.41	1	.	.	.	.
Policy count (deliberate)	2.87	2.92	0.00	2.00	9.00	.57	.52	.57	.74	−.32	1	.	.	.
Peer interaction frequency	2.89	1.09	1.00	3.00	5.00	.19	.22	.20	.30	.05	.28	1	.	.
Left-right ideology	5.61	2.35	1.00	5.00	10.00	−.23	−.11	−.28	−.11	−.05	−.07	.05	1	.
Cost concerns	6.41	2.73	0.00	7.00	10.00	.10	.13	.04	.11	.06	.07	.13	.20	1

Note. Pearson correlations with pairwise deletion. All correlations in the table are statistically significant at the $p < .01$ level.

Deviations From the Preregistration. Supplemental Section 5 contains a detailed log and narrative summary of the few instances where we deviated from the preregistration plan. All analyses reported herein adhere strictly to the preregistered analyses plans. The only deviations worthy of note are those related to data collection methods, which are referenced in Table 1 and summarized here.

Summary of Sampling Preregistration Deviations: Ireland's data collection was expanded to include collection via professional survey panels after recruitment through professional networks was much lower than expected, raising concerns that the minimum sample size would not be reached. Three Irish panels were used (Amarach, Norstat, and Strat7), and in all other regards the use of these panels followed the preregistered sampling methods of the other countries which planned to use survey panels. Austria similarly experienced very low response rates through professional networks, and therefore expanded to in-person recruitment. However this was unsuccessful at achieving the minimum sample size, and therefore Austria's data is not included in the analyses. In the United States, administrative delays in IRB approval and funding releases led to some data collection only beginning about 3 weeks after the preregistered termination date, but otherwise collection followed preregistered procedures. Lastly, in the United Kingdom, 2,038 responses were collected while the preregistered maximum was 1,000. This was done because additional funding became available shortly before data collection was to commence, and the funder required data collection in the United Kingdom (as such the funds could not be shared with another team).

To ensure fidelity to the preregistration, we conducted analyses of confirmatory hypotheses 1 and 2a/b excluding all the data collected in a manner that technically violated our preregistered recruitment methods ($N_{\text{violations}} = 1{,}839$ across UK, Ireland, and US samples, leaving $N = 2{,}595$ remaining). Supplemental Section 5.2 details those findings, which robustly replicate the confirmatory findings reported below, including replicating the effect sizes reported here.

Tests of Hypotheses and Exploratory Questions. Table 4 provides a broad overview of the evidence across the confirmatory hypotheses and exploratory questions.

Note on OLS models: All analyses reported herein use OLS regression. Preregistered examinations of model assumptions found no significant violations that might have warranted alternative model specification such as generalized linear modeling (see Supplemental Section 2 for such preregistered contingencies).

Overview of Control Variables Inclusion: As per the preregistered analysis plan, all tests of Hypotheses 2a/b and exploratory moderations of the norm effect reported below include all the control/moderation variables specified in Equations 1 and 2. Sparse models without the inclusion of control/moderation variables are reported in Supplemental Section 4 as robustness checks. As per the preregistered analysis plan, analyses of the belief trap's size only include a control for country to prevent the statistical warping of the raw difference between first- and second-order beliefs being modeled, as the difference has inherent meaning to the participant when asked.

Hypothesis 1 (Belief Trap). In support of Hypothesis 1's prediction that SME owners and leaders' exhibit a belief trap about climate action, first-order beliefs ($M = 5.69$, $SD = 3.17$) were significantly higher than second-order beliefs ($M = 5.21$, $SD = 2.83$, $d_{\text{paired}} = 0.16$, $t(4417) = 15.54$, $p < .001$) across the entire sample. This result held when examining

Table 4. Results Overview.

Confirmatory hypotheses	Statistically significant effect?		
H1 (belief trap)	Yes*** Second-order beliefs were lower than first-order beliefs about SME climate action		
H2a (norm effect on behavioral intentions)	Yes*** Second-order beliefs positively predicted behavioral intentions		
H2b (norm effect on policy count)	Yes*** Second-order beliefs positively predicted SME sustainability policy count		
Exploratory question (variable)	Predicts size of belief trap	Moderates norm effect on behavioral intentions	Moderates norm effect on policy count
EQ3 (entrep.)	Yes** (Entrepreneurs + BT)[a]	No	No
EQ4 (org size)	Yes*** (Smaller + BT)[a]	No	Yes** (Larger + NE)[a]
EQ5 (premise)	Yes*** (Rented/Online + BT)[a]	No	Yes*** (Owned + NE)[a]
EQ6 (country)	Yes*** (See details below)	Yes** (France + NE)[a]	Yes[a]** (France + NE)[a]
EQ7 (org age)	Yes** (See details below)	No	No
EQ8 (ideology)	Yes*** (Left-wing + BT)[a]	Yes*** (Right-wing + NE)[a]	No
EQ9 (peer inter.)	Yes*** (Fewer Inter. + BT)[a]	No	No
EQ10 (cost conc.)	Yes*** (Lower Concerns + BT)[a]	Yes*** (See details below)	No
EQ11 (person age)	Yes*** (Older + BT)[a]	No	No

[a]For brevity, parentheticals reference the group with a larger (+) belief trap (BT) or norm effect (NE) if it is realistic to concisely describe (e.g., "Entrepreneurs + BT" means entrepreneurs had a larger belief trap compared to non-entrepreneurs).
**$p < .01$. ***$p < .001$ (preregistered p-value cutoff of $< .01$ to be considered significant for exploratory questions).

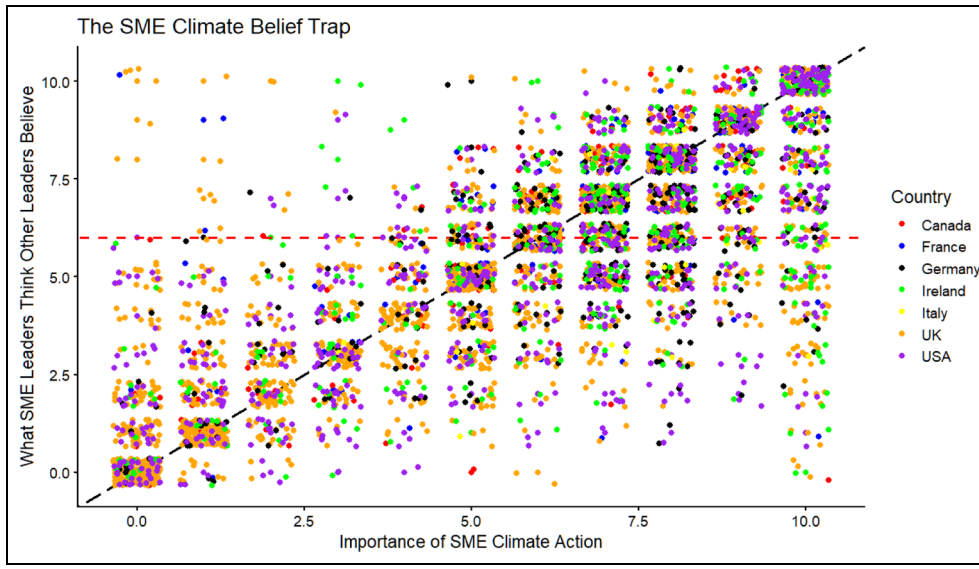


Figure 1. Belief trap scatterplot.

Note. Scatterplot of first-order beliefs (*X*-axis) and second-order beliefs (*Y*-axis) about the importance of SME climate action. Dotted red line is sample median of first-order beliefs, meaning dots below the red line represent the belief trap of SME owners and leaders underestimating support for climate action. Dots below the diagonal blackline represent SME owners and leaders who think others care less than they do personally (a self-other difference).

differences within country versus across the sample means ($d_{\text{paired}} = 0.17$, $t(4417) = 11.37$, $p < .001$). These results support the hypothesis that, on average, SME owners and leaders believe other SME owners and leaders care less than they themselves do, and as such underestimate true support for SME climate action. See EQ6 below for details on variance by country. Figures 1 to 3 visualize the belief trap.

Hypotheses 2a and 2b (Norm Effect). In support of Hypotheses 2a and 2b, second-order beliefs were positively associated with climate-action behavioral intention (H2a; $B = 0.19$, 95% CI = [0.16, 0.22], $t(4,133) = 12.57$, $p < .001$), and the number of sustainability policies adopted by one's organization (H2b, $B = 0.23$, 95% CI = [0.20, 0.27], $b_{\text{count}} = 0.71$, $t(4132) = 12.13$, $p < .001$) in regression models controlling for the SME's size, age, industry, premise ownership, and country, and participants' ideology, cost concerns, age, gender, and education (see Equation 1). This provides evidence for the hypothesized norm effect on intentions and policy implementation. Notably, the size of the norm effect on policy adoption is significantly larger than the norm effect on behavioral intention ($B = 0.23$ [0.20, 0.27] vs. 0.19 [0.16, 0.22]), and second-order beliefs predicted more variance in the policy count than did all other variables except first-order beliefs (see Supplemental Table 4.2b). Both H2a and H2b were robust to sparse models without controls, namely with only first- and second-order beliefs and their interaction as predictors (see Supplemental Tables 4.1a and 4.2a).

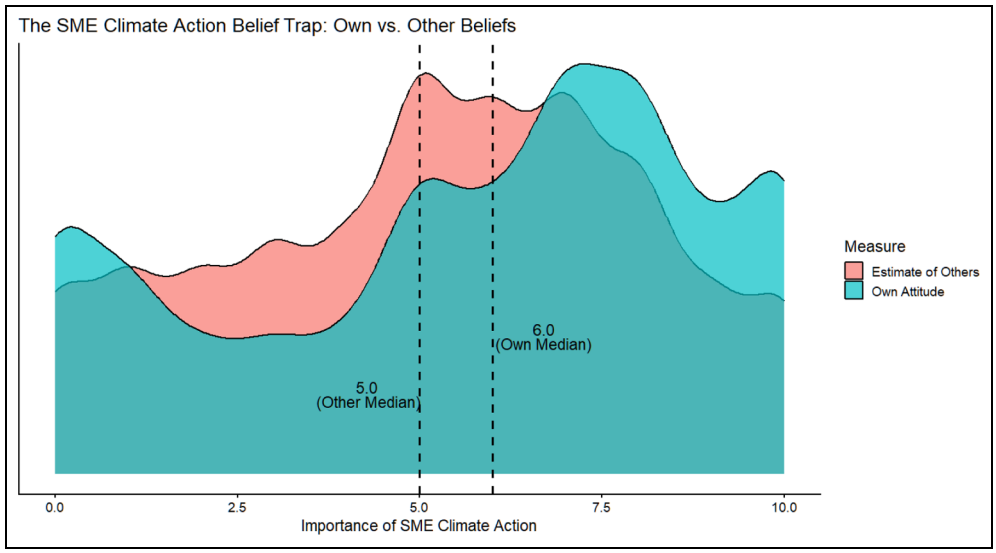


Figure 2. Belief trap density plot.
Note. Density plot of first-order beliefs (blue) and second-order beliefs (pink) about the importance of SME climate action, with corresponding sample medians (dotted lines).

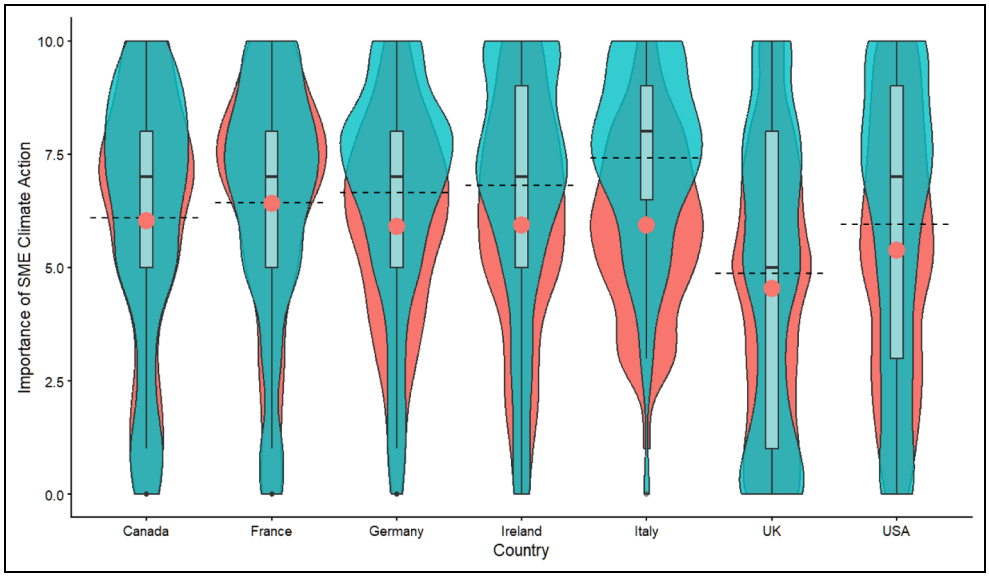


Figure 3. Belief trap violin plots by country.
Note. Violin plots of first-order beliefs (blue) and second-order beliefs (pink) about the importance of SME climate action, by County. Boxplots show first-order belief median and quartile range, dotted black lines are first-order belief means, and pink dots second-order belief means.

Exploratory Questions Overview. As per our preregistered methods, the exploratory questions each focus on a specific variable and its relationship to (a) the size of the belief trap, and (b) the strength of the norm effect (the association between second-order beliefs and intentions/policy count). Analyses of the belief trap follow a Truth & Bias Model (West & Kenny, 2011) approach, where true-mean centered second-order beliefs are regressed onto first-order beliefs, the exploratory variable of interest, their interaction, and country as a control variable. This allows the model intercept to reflect the size of the belief trap, and therefore whether it differs by the exploratory variable. Analyses of whether the exploratory variable moderates the norm effect are characterized by Equation 2 above.

Exploratory Question 3 (Entrepreneurship). Belief Trap: Entrepreneurial-status predicted the size of the belief traps ($F(1) = 8.13$, $p = .004$), with entrepreneurs showing a larger misperception ($b_{\text{entrep}} = -0.79$ vs. $b_{\text{non-entrep}} = -0.56$, $p_{\text{diff}} = 0.004$). Norm Effect: We find no evidence that entrepreneurial-status, defined as an SME that is less than 5 years old and has less than 50 employees, moderated the norm effect on behavioral intentions or the policy count (see Supplemental Tables 4.3a and b).

Exploratory Question 4 (Organization Size). Belief Trap: Organization size predicted the size of the belief traps ($F(2) = 32.89$, $p < .001$), with owners and leaders from larger SMEs showing a smaller misperception ($b_{\text{micro}} = -0.84$ vs. $b_{\text{small}} = -0.56$ vs. $b_{\text{medium}} = -0.33$, all contrasts significant at $p_{\text{diff}} = 0.001$ or smaller). Norm Effect: The size of the SME did not moderate the norm effect on behavioral intentions (see Supplemental Table 4.4a), but did moderate the norm effect on the policy count (Second-Order Belief × Org Size interaction; $F(2) = 5.69$, $p = .003$), such that the norm effect was stronger for larger SMEs (see Supplemental Tables 4.4b and c).

Exploratory Question 5 (Premises). Belief Trap: Premise ownership predicted the size of the belief traps ($F(4) = 7.55$, $p < .001$), with owners and leaders from SMEs which owned their premises showing a smaller misperception ($b_{\text{owned}} = -0.49$ vs. $b_{\text{rented}} = -0.70$ vs. $b_{\text{online}} = -0.94$, all contrasts significant at $p_{\text{diff}} = .01$ or smaller). Norm Effect: The premise ownership status of the SME did not moderate the norm effect on behavioral intentions (see Supplemental Table 4.5a), but did moderate the norm effect on the policy count (Second-Order Belief × Premise interaction; $F(4) = 6.14$, $p < .001$), such that the norm effect was stronger for SMEs which owned their premises compared to online-only (see Supplemental Tables 4.5b and c).

Exploratory Question 6 (Country). Belief Trap: Country predicted the size of the belief traps ($F(6) = 17.89$, $p < .001$). Canada ($b = -0.07$, $p = .493$) and France ($b = -0.02$, $p = .833$) showed no belief trap, the USA ($b = -0.59$, $p < .001$) and United Kingdom ($b = -0.33$, $p < .001$) showed more modest misperceptions, and Germany ($b = -0.76$, $p < .001$), Ireland ($b = -0.87$, $p < .001$), and Italy ($b = -1.56$, $p < .001$) showed the largest misperceptions. Norm Effect: The country of the SME moderated both the norm effect on behavioral intentions (Second-Order Belief × Country interaction; $F(6) = 3.30$, $p = .003$), and on the policy count (Second-Order Belief × Country interaction; $F(6) = 3.1$, $p = .005$). Examining norm effect simple slopes, SME owners and leaders from France consistently had stronger norm effects than other countries for behavioral intentions (stronger than

Ireland, United States, Germany) and the policy count (stronger than Germany, Ireland, United Kingdom, United States; see Supplemental Tables 4.6a–d).

Exploratory Question 7 (Organization Age). Belief Trap: Organization age predicted the size of the belief traps ($F(4) = 3.97$, $p = .003$); however, almost all of the pairwise contrasts between organizational age categories were statistically insignificant at the < 0.01 level, and as such no robust pattern emerged (see Supplemental Tables 4.7a and b for details). Norm Effect: The age of the SME did not moderate either the norm effect on behavioral intentions or the policy count (see Supplemental Tables 4.7c and d).

Exploratory Question 8 (Ideology). Belief Trap: Ideology predicted the size of the belief traps ($F(1) = 48.72$, $p < .001$), such that right-wing owners and leaders had lower misperceptions ($+1\,SD$ [Right-Wing] $b = -0.37$, 99% CI [−0.23, −0.51]; $-1\,SD$ [Left-Wing] $b = -0.71$, 99% CI [−0.57, −0.85]). Norm Effect: Ideology moderated the norm effect on behavioral intentions (three-way First-Order Belief × Second-Order Belief × Ideology interaction, $F(1) = 14.08$, $p < .001$), such that right-wing owners and leaders showed larger norm effects (see Supplemental Tables 4.8a and b). Ideology did not moderate the policy count (see Supplemental Table 4.8c). Right-wing SME owners and leaders has lower behavioral intentions ($B = -0.09$, 95% CI = [−0.11, −0.07], $t(4,133) = -9.68$, $p < .001$), but not lower policy count ($B = 0.01$, 95% CI = [−0.01, 0.04], $b_{\text{count}} = 0.03$, $t(4132) = 0.90$, $p = .368$; see Supplemental Tables 4.8a–c).

Exploratory Question 9 (Peer Interaction). Belief Trap: Peer interaction frequency predicted the size of the belief traps ($F(1) = 57.08$, $p < .001$), such that those with more interactions with peers had lower misperceptions ($+1\,SD$ $b = -0.44$, 99% CI [−0.31, −0.57]; $-1\,SD$ $b = -0.86$, 99% CI [−0.72, −1.00]). Norm Effect: Peer interaction frequency did not moderate either the norm effect on behavioral intentions or on the policy count (see Supplemental Tables 4.9 a and b), though peer interaction frequency positively predicted behavioral intentions ($B = 0.05$, 99% CI = [0.01, 0.08], $t(4,128) = 3.81$, $p < .001$) and the policy count ($B = 0.16$, 99% CI = [0.12, 0.20], $b_{\text{count}} = 0.49$, $t(4,127) = 10.47$, $p < .001$; see Supplemental Table 4.9c).

Exploratory Question 10 (Cost Concerns). Belief Trap: Cost concerns predicted the size of the belief traps ($F(1) = 38.42$, $p < .001$), such that those with higher cost concerns had lower misperceptions ($+1\,SD$ $b = -0.40$, 99% CI [−0.27, −0.54]; $-1\,SD$ $b = -0.84$, 99% CI [−0.70, −0.98]). Norm Effect: Cost concerns did moderate the norm effect on behavioral intentions (Three-way First-Order Beliefs × Second-Order Beliefs × Cost Concerns interaction: $F(1) = 12.90$, $p < .001$), such that owners and leaders low on cost concerns and also low on their own attitudes toward organizational climate action (first-order beliefs) displayed larger norm effects (see Supplemental Tables 4.10a and c). Cost concerns did not moderate the norm effect on the policy count (see Supplemental Table 4.10c). Cost concerns were associated with lower behavioral intentions ($B = -0.03$, 95% CI = [−0.04, −0.01], $t(4,133) = -3.02$, $p = .003$), but unassociated with the policy count ($B = 0.02$, 95% CI = [−0.00, 0.04], $b_{\text{count}} = 0.07$, $t(4,132) = 0.90$, $p = .063$; see Supplemental Tables 4.10a–c).

Exploratory Question 11 (Age). Belief Trap: Age predicted the size of the belief traps ($F(4) = 11.90$, $p < .001$), such that older individuals had higher misperceptions, with those 25 years or younger displaying no belief trap ($b = -0.24$, $p = .227$), those 25 to 35 displaying a small belief trap ($b = -0.20$, $p = .009$), and those 35 and over displaying a large belief trap (b range -0.62 to -0.73, all $p < .001$) The belief trap of those 25 to 35 was significantly smaller than that of all older cohorts (all $p < .001$, see Supplemental Tables 4.10 a and b). Norm Effect: Participant age did not moderate either the norm effect on behavioral intentions or on the policy count (see Supplemental Tables 4.11c and d).

Discussion

Results Overview

In support of Hypothesis 1, we observed a consistent gap between second-order (perceived) and first-order (actual) prescriptive norms around SME sustainability. Moreover, all nine of the investigated exploratory variables predicted its size, suggesting the misperception is a multi-determined phenomenon.

In support of Hypotheses 2a and 2b, we found that second-order norm perceptions robustly predicted SME owners and leaders' behavioral intentions and policy adoption. The norm effect on the policy count was substantial, explaining more variance than *every* other organizational or macro-level variable in our models. A one standard deviation increase in second-order beliefs predicted 0.70 more policies, which is a greater increase in policies than the difference between owned versus rented and online-only SMEs, between medium and micro sized SMEs, between the oldest and youngest SMEs, and was equal in size to the *largest* gaps between countries and between industries. This upward scaling of social norms on SME policy adoption highlights the powerful role prescriptive norms can play in affecting behavior and increasing SME sustainability.

Lastly, our preregistered exploratory analyses revealed which theory-derived variables did and, no less importantly, did not moderate the size of the belief trap and the size of the norm effect. Entrepreneurial-status, organizational age, and peer-interaction frequency did not moderate the norm effect, whereas country, organizational size, and ideology did. Interestingly, many such variables that did not moderate the norm effect still predicted the size of the belief trap. These exploratory findings provide fertile ground for future multi-level theorizing on sustainable entrepreneurship.

Theoretical Contributions

Our first contribution lies in integrating work on prescriptive norms into the entrepreneurial peer-effects literature, which has focused largely on descriptive norms (Portyanko et al., 2023). While both streams acknowledge the influence of peers on entrepreneurial decision-making, theorization around prescriptive norms aligns with an understanding of entrepreneurs as three-dimensional social actors (Wickert, 2016) who can be, and are, attuned to broader societal concerns, seeing them not only as economic opportunities or constraints but also as manifestations of values. And yet, not many entrepreneurs wear their sustainability convictions on their sleeves, meaning that peers have little to no information about the role and influence of values among their peers. Given this reality, social-psychological effects such as pluralistic ignorance must be better theorized and empirically validated in order to fully understand entrepreneurial motivation and action. Such efforts are underway in the growing field of sustainable entrepreneurship (Bailey & Lumpkin, 2023; Johnson &

Schaltegger, 2020; Rosário et al., 2022), and they can be extended and tested in entrepreneurship research more generally (e.g., the effect of second-order beliefs about the social desirability of being an entrepreneur on entrepreneurial entry (Autio et al., 2013).

Our second contribution is the generalization of climate belief trap theory both horizontally, from general populations to SME owners and leaders across multiple countries, and vertically, from individual contexts to organizational decision-making. Moreover, our design explicitly links first-order beliefs and second-order prescriptive norms to two distinct outcomes: behavioral intentions and sustainability policies implemented at the organizational level. This enables us to engage with a longstanding concern in behavioral and organizational research regarding whether attitudinal measures meaningfully generalize to real-world action. Much of the literature on climate attitudes and social norms relies on self-reported intentions or policy support as dependent variables (Constantino et al., 2022; Sparkman et al., 2022). Behavioral intentions represent low-cost, reversible commitments, whereas policy implementation represents high-cost, path-dependent decisions. Our inclusion of a policy count measure captures realized organizational decisions, which are subject to resource constraints, strategic trade-offs, and organizational priorities and commitment.

Our third contribution centers upon an analysis of factors often theorized as barriers to business climate action. Past work (e.g. Lepoutre & Heene, 2006) identifies cost as a barrier to implementing sustainability policies; however, we find that cost concerns had no predictive power over the number of climate action policies in place, showed no negative relationship with pro-climate attitudes, and did not diminish the norm effect. Those reporting higher cost concerns actually demonstrated more accurate norm perceptions. Cost concerns did predict lower behavioral intentions and correlated with right-wing political orientation. However, ideology followed the same pattern: it was associated with behavioral intentions but not with policy count. That both cost concerns and ideology predict intentions but not actual policies in place suggests that neither functions as a definitive structural barrier to climate action. Rather, we interpret both as rationalizing mechanisms through which choices about cognitive (dis)engagement are legitimated, consistent with motivated reasoning theory (Kunda, 1990; Simon & Read 2025). In fact, cost concerns were higher among those most committed to climate action, suggesting that concerns can reflect cognitive engagement and awareness of the upfront temporal costs of climate action that entrepreneurs are known to face (George et al., 2019; Shepherd & Patzelt, 2011). These findings lend support to recommendations for targeted financial incentives like green transition loans, energy efficiency grants, and upskilling support to guide entrepreneurs to look beyond early stage investments associated with climate action through (Johnson & Schaltegger, 2020).

Implications for Practice

Our findings suggest that reducing the belief trap among SME owners and leaders will help to accelerate the adoption of climate action practices, and point to a clear and actionable path SMEs can take to do so: increase peer-interactions among SME owners and leaders. Peer interaction frequency was not only robustly associated with more accurate norm perceptions, it explained the second highest amount of variance in policy uptake (only first-order beliefs explained more, see Supplemental Tables 4.9a and c). suggesting peer interactions facilitate the learning of norms just as peer interactions facilitate the learning of skills (McDonald & Eisenhardt, 2020; Miao et al., 2021).

Efforts to support greater cross-firm interaction between SME owners and leaders could accelerate the adoption of sustainability policies, similar to recent interventions showing a causal link between peer interaction and sustainable behavior (Gillingham & Bollinger, 2021). Notably, the norm effect was stronger among those with the weakest personal commitment to climate action. This points to a clear segmentation logic for intervention: social norm messaging and perception-correcting approaches will be most effective for leaders with limited intrinsic climate action motivation, Leaders already committed to climate action should instead be supported to interact with less engaged peers to raise awareness. For both sub-populations, interventions should heed recent work that has highlighted the limitations of simple, top-down social norm messaging in changing behavior (Geiger et al., 2025).

Methodological Contributions

We situate this study within two developing trends within the social sciences which have begun gaining traction in management studies, including within entrepreneurship research. The first is the use of registered reports, which developed as a response to the replication crisis/credibility revolution in psychology (Crawford et al., 2022; Korbmacher et al., 2023), and have since been hailed as an emerging best practice in social science research for increasing transparency and credibility while reducing publication biases and questionable research practices (Briker & Gerpott, 2024; Chambers & Tzavella, 2021). The second is the trend toward "big team science" (Baumgartner et al., 2023; Forscher et al., 2023), where large, often multinational teams collect data simultaneously for the sake of reliability, replicability, and generalizability in the face of the generalizability crisis (Yarkoni, 2022). While both trends entail significant logistical burdens and are not without their drawbacks and tradeoffs (discussed below), we argue that their benefits substantially outweigh their costs. Much like other social science disciplines, only about 50% of peer-reviewed business research replicates (Tyner et al., 2026), and while registered reports are not a panacea, they are designed specifically to address the many known issues that cause low replicability (Crawford et al., 2022). We hope our work serves as a blueprint for future management and entrepreneurship scholars wishing to integrate more collaborative, transparent, and replicable methods into their research.

Beyond serving as a methodological example, we believe our extensive set of exploratory hypotheses, crafted based on a theory elaboration approach (Fisher & Aguinis, 2017), provide fertile grounds for theory-driven hypotheses regarding sustainable entrepreneurial behavior. The use of a registered report format to document descriptive information about the belief trap (i.e., does it exist, what predicts its magnitude), and deeper, more process-oriented theoretical questions (i.e., what moderates the norm effect), while being theoretically agnostic toward the presence or absence of a given finding, provides a robust plateau from which scholars of sustainable entrepreneurship can build upon. To highlight just one example, we find that entrepreneurial-status, operationalized as SMEs that are both less than 5 years old and have less than 50 employees, did not moderate the norm effect. However, other planned exploratory analyses reveal why: only SME size, but not age, moderates the norm effect, such that the smallest firms (<10 employees) show the weakest norm effects. What then is the mechanism embedded within medium (vs. small/micro) sized SMEs that engenders normative behavior more aligned with that of peer-firms? These are the type of questions that registered reports give rise to and that future research could explore.

Limitations and Future Directions

Several limitations and avenues for future research are worthy of note. First, the correlational design prohibits causal inferences. While our pattern of results is closely aligned with the body of experimental work showing that perceived norms drive behavior (Gelfand et al., 2024; Nyborg et al., 2016), bidirectional causality cannot be ruled out, for example the possibility the processes of implementing new sustainability policies can in term affect SME owners' and leaders' downstream norm perceptions. Future research could examine how internal decision-making processes and structures within SME may moderate the effect of norms on policy uptake. Researchers could also consider experimental methods for developing interventions to attenuate the belief trap. Second, concerns over non-representativeness arise because several countries used opt-in recruitment methods, meaning we cannot make strong inferences regarding who has *inaccurate* perceptions of social norms, only that self-other differences in norm perceptions persist and predict behavior. Relatedly, despite a diverse sample across seven countries, the sample is still highly western and "WEIRD" (Henrich et al., 2010), which constrains generalizability to non-western, more collectivistic cultural contexts.

A third limitation is that while our diverse recruitment methods increase the generalizability of our main findings, they may introduce unobservable heterogeneity between samples. We combined data collected via probability-based YouGov survey panels (United Kingdom, France, Canada), opt-in convenience survey panels (United States, Ireland, Germany), and direct/snowball recruitment through professional networks (Ireland, Italy, Austria). This reflects a limitation of "big team science" (Forscher et al., 2023), namely that recruitment was contingent on the expertise, networks, and resources of each team, and the limited reach of some methods (e.g., probability-based sampling of SME owners was simply not available in several countries). This diversity also raises concerns regarding measurement invariance. In order to have tested for measurement invariance, all measures would have needed to be expanded from single-item formats to a *minimum* of three-items each, which would have cost tens of thousands of US dollars. This reflects a core tension when collecting high-quality data in entrepreneurship research: it is *expensive* (Maula et al., 2026) . In fact, much of the design of the final survey was motivated around being as short as possible to keep the YouGov surveys within the teams' available budgets. Nonetheless, we argue these limitations are worth the trade-off for greater generalizability, greater statistical power, and for capturing a highly diverse sample.

In conclusion, our results indicate that many SME owners and leaders substantially underestimate the extent to which their peers believe acting on climate change as an SME is important. In turn, these belief traps are associated with a lesser commitment to climate action in these businesses. Our research foregrounds the critical role of social psychological processes in the sustainability of SMEs, and suggests that greater adoption of sustainability policies among SMEs can be achieved by harnessing the power of social norms.

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Data Availability Statement

We provide the original instructions and stimuli, information on subject eligibility and selection, raw data files, and scripts used to analyze the data. We commited to making all data, sufficiently anonymized, collected as part of this Registered Report public on the Open Science Framework upon acceptance of the Stage 2 manuscript. All open materials associated with this manuscript can be found on the OSF here: https://osf.io/6ukx2/. This includes (a) a copy of the accepted Stage 1 manuscript, which serves as a copy of the preregistration, (b) all materials associated with the original submission of the Stage 1 manuscript (namely, pilot data and analyses, (c) updated and translated copies of all final survey language, and (d) copies of the raw data and R analysis code used to generate the results herein.

Supplemental Material

Supplemental material for this article is available online.

Notes

1. In the surveys fielded through YouGov, we used only the "advocate" item. This was a cost-saving measure, and the advocate item was chosen for its slightly higher correlations with the other variables, relative to the other item.
2. The open comment was not included in the surveys fielded through YouGov, as a cost-saving measure.

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