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RESEARCH ARTICLE

An attention-based perspective on how climate impact affects opportunity entrepreneurship

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Abstract Climate impact, which refers to the losses resulting from climate change-related events, is one of the most pressing challenges for societies worldwide. Contributing to the climate impact–entrepreneurship nexus, we assess how climate impact affects individual engagement in opportunity entrepreneurship. Drawing on the attention-based view (ABV) and on socio-cognitive theory (SCT), we hypothesize that climate impact increases opportunity entrepreneurship, and that this effect is moderated by individuals' socio-cognitive characteristics. Combining data from the Global Entrepreneurship Monitor (GEM) and the Climate Risk Index (CRI), we conduct a multilevel analysis that involves 964,440 individuals from 94 countries from 2010 to 2018. In support of our hypotheses, our results suggest that climate impact is positively related to engagement in opportunity entrepreneurship. We also find that this association is negatively moderated by entrepreneurial self-efficacy and entrepreneurial alertness, and positively by entrepreneurial fear of failure. We conclude by discussing the implications of our attention-based understanding of climate impact as a catalyst for opportunity entrepreneurship.

Plain English Summary Climate impact is one of the most pressing societal challenges. Climate impact refers to human and economic losses resulting from climate change-related extreme weather events, such as storms (e.g., typhoons, hurricanes), floods, draughts, and wildfires. Because of its considerable societal and economic consequences, climate impact also affects entrepreneurs and enterprises globally. Our study shows that higher climate impact leads to more individuals starting businesses to take advantage of new opportunities (i.e., opportunity entrepreneurship). We also reveal that several individual characteristics shape this relationship between climate impact and engagement in opportunity entrepreneurship: individuals who have a stronger belief in their capabilities (i.e., high entrepreneurial self-efficacy) and who are more entrepreneurially vigilant and have a higher capacity to detect new opportunities (i.e., high entrepreneurial alertness) pay less attention to starting opportunity-based businesses when their country faces greater climate impact. In contrast, individuals who are generally more afraid of failing with their business (i.e., high entrepreneurial fear of failure) now feel more encouraged to engage

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in new opportunities for enterprises. By uncovering the complex interplay between climate impact and opportunity entrepreneurship, our results provide policymakers and other societal stakeholders with an evidence-based foundation to establish support mechanisms that help foster opportunity entrepreneurship in the aftermath of climate impact. Specifically, our evidence-based approach provides implications on how policy programs can be specifically designed to better serve different individual characteristics.

Keywords Climate impact · Opportunity entrepreneurship · Attention-based view (ABV) · Climate Risk Index (CRI) · Multilevel analysis

JEL Classification L26 · Q01 · Q54

1 Introduction

Climate impact refers to the human and economic losses resulting from the physical impact of climate change-related extreme weather events (e.g., Huang et al., 2017; Yoon et al., 2024). Climate impact is a pressing and global societal challenge that inflicts widespread damage on organizational and social life (e.g., Nyberg & Wright, 2022), with strong implications for entrepreneurship (e.g., Boe-Lillegraven et al., 2024; Boudreaux et al., 2022; Williams & Shepherd, 2016b).

However, and in contrast to what is commonly believed, many studies suggest that climate impact does not only cause damage but can also lead to the emergence of entrepreneurial opportunities to develop and engage in diverse forms of venturing (e.g., Dutta, 2017; Shepherd & Williams, 2014; Wei et al., 2024; Yoon et al., 2024). Yet, and despite the staggering consequences of climate impact, most individuals, including prospective entrepreneurs, do not pay much attention to climate impact in their daily lives, until the topic becomes salient for them (e.g., Carlson et al., 2022; Luo & Zhao, 2019, 2021). An explanation for this cognitive effect is provided by the attention-based view (ABV) (Ocasio, 1997), which argues that the individual allocation of attention (at the micro level) is strongly influenced by situational characteristics and developments in the environment (at the macro level). Specifically, the ABV conceptualizes attention as a stimulus and limited cognitive resource that reflects the individual willingness to invest in processing information (e.g., Ocasio, 1997; Shepherd & Patzelt, 2018). Because individuals have limited information-processing capabilities, they must focus their attention on a selected set of stimuli when making decisions, including the decision to engage in entrepreneurship (e.g., Ocasio, 1997; Shepherd & Patzelt, 2018). Hence, when climate impact becomes salient, through direct experiences or indirectly through media coverage, the increased focus on climate impact-related information amplifies the perceived severity of the risk associated with climate impact. In turn, this prompts individuals to allocate attention to how they can meet the challenges associated with climate impact by changing their behavior (e.g., Carlson et al., 2022; Guzman et al., 2023; Hong et al., 2019). Consequently, we argue that engaging in entrepreneurship is one outcome of this situated attention allocation in the wake of climate impact.

More specifically, we investigate the intersection of climate impact and engagement in *opportunity* entrepreneurship, which is a critical pillar of economic growth, employment, and innovation (e.g., Acs, 2006; Valliere & Peterson, 2009). Despite the mounting evidence that climate impact is a macro-level factor that increasingly shapes entrepreneurship in diverse ways (e.g., Boudreaux et al., 2019a, 2022, 2023; Cordero, 2023; Ye et al., 2023), significant knowledge gaps remain about whether and how climate impact affects individuals' tendencies towards opportunity entrepreneurship. This is a critical shortcoming because climate impact can rapidly and profoundly reshape a country's framework conditions for opportunity entrepreneurship, often more dramatically and rapidly than institutional shifts (e.g., Hsiang & Jina, 2014). For example, climate impact can abruptly alter local market conditions, resource availabilities, and policies, creating both significant challenges and novel business opportunities (IPCC, 2022). At the same time, opportunity entrepreneurship can be a critical vehicle for combating climate impact and its various consequences (e.g., Yoon et al., 2024). Therefore, entrepreneurs who quickly and creatively respond to climate-induced disruptions can catalyze positive change by developing urgently needed products, services, and business models that strengthen local resilience (e.g., Williams & Shepherd, 2016a). Thus, deepening our understanding of the interaction between climate impact and opportunity entrepreneurship is essential for fostering resilience and sustainable development beyond filling an important research gap (e.g., Boe-Lillegraven et al., 2024; Boudreaux et al., 2022). Developing a more comprehensive understanding of the relationship between climate impact and opportunity entrepreneurship has crucial implications for policymakers and other societal stakeholders seeking to navigate the increasing challenges of recurring climate disruptions. Hence, our first research question is: *how does climate impact affect individual engagement in opportunity entrepreneurship?*

In addition, research consistently shows that the effect of macro-level factors on individual engagement in opportunity entrepreneurship varies across individuals (e.g., Block & Wagner, 2010; Boudreaux & Nikolaev, 2019; Zhang & Acs, 2018). In particular, socio-cognitive traits (e.g., entrepreneurial self-efficacy, alertness, and fear of failure) are documented to moderate the effect of country-level characteristics on individual engagement in opportunity entrepreneurship (e.g., Boudreaux et al., 2019b, 2023; Estrin et al., 2013; Schade & Schuhmacher, 2022). Similarly, studies utilizing the ABV highlight how cognitive characteristics at the individual level interact with external factors to shape attention allocation (e.g., Ocasio, 1997; Stevens et al., 2015). Thus, to offer a nuanced understanding of how climate impact influences individual engagement in opportunity entrepreneurship, we integrate insights from the ABV and socio-cognitive theory (SCT) (Bandura, 1986) to provide more detailed insights on how individual-level factors interact with climate impact in affecting opportunity entrepreneurship. Conceptually, the ABV posits that individual attention allocation, tied to cognitive capabilities, determines decision-making and behavior, with differences in information-processing explaining variations in outcomes. Similarly, SCT underscores how socio-cognitive characteristics influence cognitive, behavioral, and environmental factors, shaping how individuals selectively process information and moderating attention allocation in contexts such as climate-driven entrepreneurial engagement. Thus, our second research question is: *how do socio-cognitive characteristics moderate the relationship between climate impact and opportunity entrepreneurship?*

To address our research questions, we combine individual-level data from the Global Entrepreneurship Monitor (GEM) with country-level data from the Climate Risk Index (CRI), yielding a sample of 964,440 individuals from 94 countries between 2010 and 2018. Our multilevel analyses largely support our theoretical considerations: after a country experiences higher levels of climate impact, the likelihood that individuals will engage in opportunity entrepreneurship increases. In addition, we find that this positive relationship is negatively moderated by entrepreneurial self-efficacy and entrepreneurial alertness, and positively by entrepreneurial fear of failure. Our additional analyses also reveal that being female positively moderates the main relationship, whereas higher levels of human capital negatively moderate it. Finally, we show that our findings are robust across different specifications.

Our study offers three contributions. First, we contribute to the growing research on climate impact and entrepreneurship (e.g., Boudreaux et al., 2019a; Dutta, 2017; Shepherd & Williams, 2014; Yoon et al., 2024). We extend this research by taking a broad perspective that explores the intersection of environmental changes, individual characteristics, and opportunity entrepreneurship across countries and years. Our main finding that climate impact increases the likelihood of individual engagement in opportunity entrepreneurship challenges some previous studies reporting a negative association between climate impact and overall entrepreneurship levels (e.g., Boudreaux et al., 2019a, 2022; Cordero, 2023). However, this result simultaneously aligns with several studies that suggest the possibility of a positive relationship (e.g., Muñoz et al., 2019; Salvato et al., 2020; Shepherd & Williams, 2014; Wei et al., 2024). This implies that research on the nexus between climate impact and entrepreneurship is sensitive. For example, differing results across studies might relate to the analytical strategies (e.g., sample composition, methodological design), the nature of climate impact data, or the entrepreneurial activity under investigation (e.g., opportunity entrepreneurship, social entrepreneurship). This suggests that research on climate impact and entrepreneurship needs to be particularly nuanced and considerate when trying to draw general conclusions or when formulating policy recommendations.

Second, we contribute to research on the role of attention in entrepreneurship (e.g., Wei et al., 2024; Yoon et al., 2024). Specifically, by drawing on the ABV, we posit that climate impact affects the individual allocation of attention towards engagement in opportunity entrepreneurship. More precisely, our arguments emphasize the role of situated attention, a core construct in ABV theorizing that is, however, under-researched, as highlighted by Brielmaier and Friesl (2023). Against this backdrop, our findings suggest that climate impact influences the allocation of attention, and that this effect is shaped by socio-economic characteristics. Overall, our study suggests that combining the ABV and SCT can provide a robust theoretical foundation to explain the role of cognitive processes in determining individual behavior for various entrepreneurship outcomes (e.g., Baron, 2004; Grégoire et al., 2011). As a novelty in entrepreneurship research, using the ABV and SCT in conjunction further offers a new theoretical perspective well-suited for multilevel investigations that analyze the interplay of macro-level and micro-level factors on entrepreneurial outcomes. Merging the ABV and SCT is a useful theoretical avenue to explain the sometimes seemingly counterintuitive effects that socio-cognitive moderators can have in the context of climate impact-related events or other crises (e.g., Bergenholtz et al., 2023).

Third, we contribute to research on opportunity entrepreneurship (e.g., Boudreaux et al., 2019b; Crecente et al., 2021; Estrin et al., 2024). While prior research explores the role of the institutional environment for opportunity entrepreneurship (e.g., Aparicio et al., 2016; Boudreaux & Nikolaev, 2019; Boudreaux et al., 2019a), we introduce climate impact as an important and hitherto-overlooked framework condition. Specifically, we provide an initial understanding of how disruptive climate impact shapes individuals' tendencies towards opportunity entrepreneurship. In doing so, we extend research highlighting the importance of jointly examining country-level and individual-level factors when investigating engagement in opportunity entrepreneurship (e.g., Boudreaux & Nikolaev, 2019; Boudreaux et al., 2019b).

2 Prior research on climate impact and entrepreneurship

Spurred by its pressing societal relevance, environmental changes stemming from climate impact (e.g., natural disasters) attract increasing empirical attention in entrepreneurship research.

On the one hand, a range of studies link natural disasters to reduced entrepreneurial activity. For example, using startup data from the World Bank's entrepreneurship database, Boudreaux et al. (2019a) show that climate impact diminishes startup activity. This evidence is bolstered by Codero's (2023) research in the US context, which suggests that negative emotional and cognitive biases inhibit the formation of new ventures. In addition, Boudreaux et al. (2022) conduct an 11-year macro-level panel analysis across 85 countries, drawing on aggregated data from GEM and the World Bank. Their findings also suggest that climate impact adversely affects entrepreneurship, although foreign aid and economic freedom help mitigate this negative effect.

On the other hand, a growing body of work suggests that natural disasters can have an enabling effect on entrepreneurship. For instance, several studies draw on case studies of climate-related disasters to illustrate how entrepreneurial efforts in the aftermath of specific events such as earthquakes and wildfires can mitigate local suffering and foster resilience (e.g., Farny et al., 2019; Muñoz et al., 2019; Salvato et al., 2020; Shepherd & Williams, 2014; Williams & Shepherd, 2016a). Specifically, these studies highlight how such disruptive events give rise to novel local venturing opportunities, thereby acting as push factors for entrepreneurship. Further quantitative evidence supports this notion. For example, Dutta (2017) and Wei et al. (2024) find that exposure to climate impact makes individuals more inclined to engage in social entrepreneurship. Relatedly, Ye et al. (2023) show that heightened climate impact spurs stronger growth aspirations among entrepreneurs, while Yoon et al. (2024) report that climate impact is associated with more sustainable innovations at the country level.

These inconclusive findings suggest that the relationship between climate impact and entrepreneurship is multilayered and complex. In response, recent studies adopt more comprehensive multilevel perspectives which offer a rich analytical lens that captures how macro-level factors (e.g., environmental disruptions) interact with micro-level attributes (e.g., socio-cognitive characteristics), thereby revealing the distinct and combined drivers of entrepreneurial behavior in more nuanced ways than single-level analyses. These studies provide preliminary evidence that individual-level factors are particularly salient under severe climate conditions. For example, Wei et al. (2024) and Ye et al. (2023) reveal the importance of gender, human capital, and fear of failure in shaping entrepreneurs' responses to climate impact. We aim to extend prior inquiries on the relationship between climate impact and entrepreneurship.

3 Theory and hypotheses

Building on the notions of bounded rationality and limited attentional capability, the ABV models organizations as "systems of distributed attention" (Ocasio, 1997: 189) and argues that decision-makers' attention allocation affects organizational outcomes. The ABV is widely used in organization and management research to explain a plethora of organizational outcomes (e.g., Brielmaier & Friesl, 2023). While ABV-based research typically focuses on managerial decision-makers in large and established organizations, recent research extends these arguments to the domain of entrepreneurship, highlighting the critical role of entrepreneurial attention for entrepreneurship outcomes (e.g., Shepherd & Patzelt, 2018; Wei et al., 2024; Yoon et al., 2024).

The ABV's conceptual building blocks operate at multiple levels, capturing the mechanisms that shape the allocation of attention at the micro (i.e., individual) and macro level (i.e., environment). Regarding the micro level, the ABV defines attention as "the noticing, encoding, interpreting and focusing of time and effort by organizational decision makers" (Ocasio, 1997: 189). Accordingly, information-processing is the cognitive process at the core of ABV theorizing. Because individuals have limited cognitive capabilities, they need to focus their attention on a selected set of stimuli when processing information to make decisions (e.g., Ocasio, 1997), rendering attention a "limited cognitive resource" (e.g., Shepherd & Patzelt, 2018: 105). This attentional allocation can also include the degree of attention that individuals pay to certain stimuli (e.g., Ocasio, 2011), which reflects the effort individuals invest when processing information.

Regarding the macro level, the ABV recognizes a wide range of environmental factors that individuals consider when selecting and processing information, thus shaping their allocation of attention (e.g., Ocasio, 1997). These factors can be external (e.g., culture, resources, economic factors, regulations) and internal to the organization (e.g., past decisions, strategy). Focusing on the environmental embeddedness of attentional allocation, prior research stresses that the allocation of decision-makers' attention is indeed affected by factors such as industry velocity (e.g., Nadkarni & Barr, 2008) or competition and regulation (e.g., McCann & Bahl, 2017). This joint relevance of micro-level and macro-level factors makes the ABV a multilayered theory suitable for modeling attention structures across different levels (e.g., Ocasio, 1997; Stevens et al., 2015).

3.1 Main effect: climate impact, situated attention, and opportunity entrepreneurship

We hypothesize that climate impact can spur individual engagement in opportunity entrepreneurship. Following the ABV, our theoretical rationale is that climate impact acts as an environmental stimulus that shapes how individuals allocate attention and, by extension, make decisions (here: decide to engage in opportunity entrepreneurship). This aligns with an increasing number of studies suggesting that climate impact affects the individual allocation of attention, thereby shaping responses to climate impact (e.g., Carlson et al., 2022; Guzman et al., 2023; Hong et al., 2019). The conceptual anchor for our argumentation is the notion of situated attention, a core construct in ABV theorizing (e.g., Brielmaier & Friesl, 2023; Ocasio, 1997).

Situated attention posits that how individuals allocate their attention fundamentally depends on situational characteristics. Consequently, this perspective links individual cognition and decision-making to unique situational circumstances (Ocasio, 1997). Following this rationale, we argue that climate impact is a critical situational characteristic that affects the individual allocation of attention. This is in line with Madsen and Rodgers (2015) who show that climate events of varying severity elicit different allocations of situated attention, thereby influencing the specific actions that individuals take. Specifically, we outline three situational characteristics that help explain why climate impact spurs individuals towards opportunity entrepreneurship.

First, entrepreneurship commonly emerges from individuals allocating their attention toward market imperfections and disruptions that allow them to identify and seize opportunities (e.g., Cohen & Winn, 2007; Yoon et al., 2024). This also applies to the aftermath of climate events, which can represent a disruptive and incisive context that can result in individuals detecting opportunities to engage in entrepreneurship (e.g., Boudreaux et al., 2023; Salvato et al., 2020; Shepherd & Williams, 2014). Such climate impact-induced market inefficiencies can take various forms and attract individuals' attention to opportunities resulting from direct (e.g., destroyed infrastructure, disrupted supply chains) and indirect (e.g., need for new technological solutions, adapted products or services) exposure to climate impact. The situated attention towards emerging market imperfections also aligns with research documenting a climate impact-related shift in consumer preferences (e.g., Goebel et al., 2015; Owen et al., 2012) towards greater environmental concerns. Entrepreneurs may be quicker to respond to such shifting consumer preferences than established ventures.

Second, governments, NGOs, and other organizations often provide support and incentives to stimulate economic recovery in areas affected by severe climate events (e.g., Boudreaux et al., 2022; Boudreaux et al., 2023). This support can be financial (e.g., grants, low-interest loans, tax breaks) and non-financial (e.g., physical resources, human resources, reconstruction services). In line with prior research applying the ABV to aspects such as regulation changes or government support (e.g., Brielmaier & Friesl, 2023; McCann & Bahl, 2017), we argue that support mechanisms attract individuals' attention and trigger them to pursue new entrepreneurial opportunities. For example, the "Reemprende" program of the government of Chile allocated financial resources towards reestablishing damaged and destroyed businesses, raising individuals' attention toward entrepreneurial opportunities in the affected communities (Muñoz et al., 2019).

Third, climate impact can create a context with less competition for prospective entrepreneurs (e.g., McCann & Bahl, 2017; Nadkarni & Barr, 2008). In the wake of climate impact, the performance and survival of established firms are threatened by damaged assets and disrupting value chains. This aligns with empirical evidence documenting that climate impact is associated with lower and more volatile earnings (Huang et al., 2017), lower operational and financial performance, and a higher likelihood of credit default (Huang et al., 2022), highlighting the profound negative consequences of climate impact for established ventures. Prospective entrepreneurs may focus on these changes in market competition, which is why lower competition and fewer entry barriers encourage opportunity entrepreneurship.

For each of the three situational characteristics outlined above, we note that climate impact can shape the situational allocation of attention both directly and indirectly. The direct attentional effect stems from an individual's first-hand exposure to the material consequences of climate impact. This direct exposure can be multifaceted, comprising exposure to damages to public infrastructure or private property, resource scarcity (e.g., water, clean air), or prolonged periods of extreme heat or rain and thus direct individuals' attention toward addressing these challenges. The indirect attentional effect encapsulates factors that may increase individuals' attention allocation to activities resulting from climate impact without direct physical exposure. For example, after a country experiences a severe climate impact, media attention is high regionally, nationally, and sometimes even internationally, increasing the attention towards climate impact issues (e.g., Carlson et al., 2022).

In summary, we argue that climate impact leads to the allocation of situated attention, which can spur individual engagement in opportunity entrepreneurship. We hypothesize:

> *H1: Higher levels of climate impact in a country are associated with a higher individual likelihood of engaging in opportunity entrepreneurship.*

3.2 Moderators: socio-cognitive characteristics

Socio-cognitive theory (SCT) (Bandura, 1986) is a preeminent theory of psycho-social functioning that explains individual behavior as the outcome of a bidirectional interaction between personal, environmental, and behavioral determinants. Representing SCT's conceptual core, the dynamic interplay of these determinants is termed the process of triadic reciprocal causation, which seeks to provide a nuanced account of various underlying mechanisms that determine individual behavior (e.g., Bandura, 1986, 2001).

Entrepreneurship research commonly leverages SCT as a theoretical framework for explicating how individuals' cognitive characteristics relate to entrepreneurship outcomes. Specifically, three specific socio-cognitive characteristics that reflect domain-specific, self-referential cognitive processes are critical to entrepreneurial action-formation processes:

entrepreneurial self-efficacy, *entrepreneurial alertness*, and *entrepreneurial fear of failure*. By underscoring how personal cognitions, environmental conditions, and behaviors interact reciprocally, SCT clarifies why these three socio-cognitive characteristics are central to entrepreneurial decision-making (e.g., Bandura, 1986, 2001). Entrepreneurial self-efficacy stems from self-referential beliefs about one's capabilities, entrepreneurial alertness reflects the capacity to detect and interpret opportunities, and entrepreneurial fear of failure relates to emotional constraints that may temper risk-taking. In SCT terms, each of these factors both shapes and is shaped by external contexts and individual actions, making them pivotal for understanding the formation of and variation in entrepreneurial behavior. In combination, these characteristics provide a nuanced representation of cognitive elements that contribute to explaining engagement in entrepreneurship. Their distinctive and joint significance as determinants of engagement in entrepreneurship is well-established (e.g., Boudreaux et al., 2019b; Schade & Schuhmacher, 2022).

We blend arguments from the ABV and SCT to develop an integrative theoretical perspective explaining how climate impact affects engagement in opportunity entrepreneurship, as well as how socio-cognitive characteristics moderate this attention allocation process. Essentially, the ABV suggests that individuals' situational allocation of attention determines their decision-making and behavior. As such, ABV intertwines an individual's allocation of attention in a certain situation with their cognitive capabilities, especially the recognition, processing, and leveraging of information. Differences in individuals' information-processing capabilities thus help explain dissimilar behavioral patterns, even under the same situational circumstances (e.g., Ocasio, 1997). Similarly, SCT assumes that socio-cognitive characteristics affect individual behavior through their influence on cognitive, behavioral, and environmental determinants. Thus, mirroring the reasoning of the ABV, an important mechanism in SCT refers to socio-cognitive characteristics shaping how individuals react to and process information (e.g., Bandura, 1989). Moreover, SCT recognizes the role of attentional processes in determining that individuals selectively observe and process information (e.g., Bandura, 2001), again echoing the ABV's argumentation. Hence, at their core, both theories refer to cognitive capabilities and seek to explain how individuals process information. In short, connecting both theories allows us to coherently hypothesize how climate impact shapes individual engagement in opportunity-motivated entrepreneurship (via the allocation of attention).

In the following, we argue that the effect of climate impact on engagement in opportunity entrepreneurship (H1) is moderated by the socio-cognitive characteristics of entrepreneurial self-efficacy (H2a), entrepreneurial alertness (H2b), and entrepreneurial fear of failure (H2c).

3.2.1 Entrepreneurial self-efficacy

Entrepreneurial self-efficacy captures "the strength of a person's belief that he or she is capable of successfully performing the various roles and tasks of entrepreneurship" (Chen et al., 1998: 295). Research highlights the profound positive association between higher values in entrepreneurial self-efficacy and engagement in entrepreneurship (e.g., Rauch & Frese, 2007) as well as opportunity entrepreneurship more specifically (e.g., Boudreaux et al., 2019b). Moreover, entrepreneurial self-efficacy can be an important moderator for other factors in determining entrepreneurship outcomes (e.g., Boudreaux et al., 2019b; Newman et al., 2019; Yang et al., 2020). Most importantly, however, research shows the crucial role of self-efficacy in the allocation of attention (e.g., Gielnik et al., 2020; Themanson & Rosen, 2015).

Therefore, we argue that entrepreneurial self-efficacy shapes the attention that individuals allocate to opportunity entrepreneurship in countries with different levels of climate impact. In particular, entrepreneurial self-efficacy affects the attention that individuals assign to entrepreneurial opportunities in specific situations. SCT describes a close connection between self-efficacy and individual beliefs in the capability to exercise control (e.g., Bandura, 1989), while also outlining that the controllability of the environment interrelates with self-efficacy (e.g., Wood & Bandura, 1989). Thus, individuals are more motivated to exercise self-efficacy if they perceive the environment to be controllable, which is conducive for the allocation of attention and, in turn, performing certain actions. This is reflected in prior research, which demonstrates that entrepreneurial self-efficacy amplifies the effect of environmental dynamism or perceived uncertainty on entrepreneurship (e.g., Hmieleski & Baron, 2008;

Schmitt et al., 2018). In contrast, individuals exercise self-efficacy only "weakly and abortively" (Wood & Bandura, 1989: 374) in environments with a lack of perceived control. This implies that individuals high in self-efficacy will reduce the amount of attention they allocate to entrepreneurial actions in uncontrollable environments, instead favoring more controllable environments in which they can better exercise and benefit from their self-efficacy.

This is in line with Renko et al. (2021), who highlight that entrepreneurial self-efficacy is particularly crucial in stable environments, characterized by low levels of fragility and adversity, with minimal violent conflict and robust institutional structures. For instance, the Fragile States Index identifies Norway and Finland as the most stable countries in the world, reflecting their strong cohesion and favorable economic, political, and social indicators (e.g., Fragile States Index, 2024). Such conditions foster a sense of control, empowering individuals to more effectively harness their entrepreneurial self-efficacy. Consequently, the more cohesive and resilient a country's institutional framework, the more its entrepreneurial environment is perceived as manageable and conducive to entrepreneurial action. This argumentation is supported by Bergenholtz et al. (2023), who demonstrate that entrepreneurial self-efficacy is a weaker predictor of entrepreneurial intentions in contexts that are defined by greater risks and uncertainties, suggesting that in these situations entrepreneurial opportunities receive less attention of individuals high in self-efficacy.

Applied to the climate impact–opportunity entrepreneurship nexus, we thus propose that self-efficacy negatively moderates the relationship between climate impact and opportunity entrepreneurship. At first sight, this might seem counterintuitive, as it contradicts the common notion that self-efficacy can be conducive to engagement in opportunity entrepreneurship (e.g., Schade & Schuhmacher, 2022) when studied in isolation of decisive person-environment dynamics. However, we argue that, when considering essential contextual factors, self-efficacy negatively moderates the main relationship because climate impact leads to a substantial increase in environmental uncertainty. Therefore, and in conjunction with the core arguments of the ABV and SCT, we expect that higher values in entrepreneurial self-efficacy reduce the amount of attention attributed to entrepreneurial opportunities in these situations. For example, disrupted supply chains, diminished functioning of uncertainty-reducing institutions, and demand uncertainty all create environmental uncertainty after a country faces a severe climate event (e.g., Nyberg & Wright, 2022; Wei et al., 2024). This increase in uncertainty coincides with a lower perceived control of the environment so entrepreneurs with high entrepreneurial self-efficacy will shift their attention elsewhere and will engage less likely in opportunity entrepreneurship. In addition, entrepreneurs with higher self-efficacy may be more inclined to concentrate on immediate, controllable tasks (e.g., stabilizing current activities) rather than scanning for novel opportunities that appear riskier under turbulent conditions (e.g., Townsend et al., 2018). As a result, the intensified uncertainty introduced by climate impact, combined with a strong belief in personal capabilities, could paradoxically lead these entrepreneurs to redirect their attention away from new venture creation, thereby dampening the pursuit of opportunity entrepreneurship. In sum, we hypothesize:

> *H2a: The positive relationship between climate impact and individual engagement in opportunity entrepreneurship will be weaker for individuals high in entrepreneurial self-efficacy.*

3.2.2 Entrepreneurial alertness

Entrepreneurial alertness reflects an individual's ability to recognize and act on new entrepreneurial opportunities within specific contexts (e.g., Kirzner, 1979). Entrepreneurial alertness affects opportunity recognition and thus constitutes a foundational feature in entrepreneurship theorizing (e.g., McMullen & Shepherd, 2006; Valliere, 2013a). Higher values in entrepreneurial alertness are an antecedent of increased engagement in entrepreneurship (e.g., Araujo et al., 2023) and opportunity entrepreneurship (e.g., Boudreaux et al., 2023). Moreover, entrepreneurial alertness interacts with macro-level factors, jointly affecting entrepreneurship outcomes (e.g., Boudreaux et al., 2019b; Roundy et al., 2018; Schade & Schuhmacher, 2022). Again, prior research documents the distinctive role of alertness when discussing individuals' attention allocation to entrepreneurial activities in certain situations (e.g., Srivastava et al., 2021; Valliere, 2013a, b).

We argue that entrepreneurial alertness shapes the attention that individuals allocate to opportunity entrepreneurship in countries with different levels of climate impact. Contemporary conceptualizations of entrepreneurial alertness (e.g., Tang et al., 2012) emphasize that alertness encompasses the active scanning and search for new information or environmental changes. We argue that these processes can increase attention to entrepreneurial opportunities. This is because heightened awareness enables these alert individuals to have a wider and more diverse set of potential opportunities that they can consider exploiting (e.g., Valliere, 2013a). Moreover, entrepreneurial alertness is based on cognitive processes and capacities, such as information processing skills and prior knowledge (e.g., Baron, 2004; Tang et al., 2012). This cognitive dimension also establishes a link between entrepreneurial alertness and ABV, which highlights the role of information perception, encoding, and interpretation by the individual (e.g., Ocasio, 1997). Thus, entrepreneurial alertness is closely linked to the individual allocation of attention and can shape the amount of situated attention that individuals allocate to opportunities when they perceive environmental changes (e.g., Valliere, 2013a, b).

Applied to the climate impact–opportunity entrepreneurship nexus, we expect higher values in entrepreneurial alertness to negatively moderate the relationship between climate impact and opportunity entrepreneurship. This seems counterintuitive, as it contradicts the common belief that opportunity alertness is a moderator that generally strengthens engagement in entrepreneurship (e.g., Boudreaux et al., 2019b). However, in situations of severe climate impact, the disruptive environment may overwhelm highly alert individuals with information and competing signals from different perspectives and possibilities (e.g., Garnett & Kouzmin, 2007), causing them to pay less attention to entrepreneurial endeavors. Thus, such heightened sensitivity can become a hindrance when individuals receive numerous or conflicting indications of where to act first. Furthermore, since the overall amount of attention is limited (e.g., Ocasio, 1997), we assume that entrepreneurially highly alert individuals have already distributed their attention to entrepreneurial opportunities, so that additional changes in the external environment do not attract these individuals' attention towards entrepreneurship as it does for individuals who possess less entrepreneurial alertness. This is supported by research showing that individuals with high human capital are less likely to pursue social entrepreneurship after experiencing climate impact (Wei et al., 2024).

In contrast, individuals less alert toward entrepreneurial opportunities might feel morally triggered to engage in a cooperative response (e.g., Rao & Greve, 2018). Hence, these individuals, who typically engage less in environmental scanning and information search, now shift their attention towards the collective search for alleviating suffering or mitigation and adaptation opportunities and provision of better solutions, creating an emergence of new (compassionate) venturing (e.g., Shepherd & Williams, 2014). In such cases, lower alertness can paradoxically reduce information overload, allowing individuals to allocate attention toward entrepreneurial opportunities. Consequently, their situated attention attribution to entrepreneurial activities resulting from climate impact should not be diminished or might even increase. Thus, we hypothesize:

H2b: The positive relationship between climate impact and individual engagement in opportunity entrepreneurship will be weaker for individuals high in entrepreneurial alertness.

3.2.3 *Entrepreneurial fear of failure*

Entrepreneurial fear of failure refers to "a negative feeling that results from the anticipation of the possibility of failure [in entrepreneurship]" (Cacciotti et al., 2016: 305). Prior research documents a negative association between entrepreneurial fear of failure and engagement in entrepreneurship (e.g., Cacciotti & Hayton, 2015; Morgan & Sisak, 2016) and opportunity entrepreneurship more specifically (e.g., Boudreaux et al., 2019b, 2023), as one of the major inhibitors for entrepreneurial behavior. Moreover, entrepreneurial fear of failure interacts with macro-level factors, jointly affecting engagement in entrepreneurship (e.g., Dutta & Sobel, 2021; Henriquez-Daza et al., 2024; Wennberg et al., 2013).

We argue that entrepreneurial fear of failure shapes the attention that individuals allocate to opportunity entrepreneurship in countries with different levels of climate impact. That is, individuals high in fear of entrepreneurial failure will allocate less attention to entrepreneurial activities and situations in which they perceive failure to be more likely and failure's consequences to be more severe (e.g., Cacciotti et al., 2016). This also implies that the perception of failure and the evaluation of its consequences is based on an individual's information processing and cognitive assessment, establishing a link to the ABV (e.g., Ocasio, 1997). Going further, the literature on entrepreneurial failure's consequences describes that the individual consequences of entrepreneurial failure are multifaceted and can be social (e.g., loss of social relationships, lower social standing, stigmatization), financial (e.g., loss of income, accumulation of debt), and psychological (e.g., decreased well-being, grief) (e.g., Fisch & Block, 2021; Ucbasaran et al., 2013).

Applied to the climate impact–opportunity entrepreneurship nexus, we argue that climate impact should alleviate the negative consequences associated with entrepreneurial failure, leading to increased engagement in opportunity entrepreneurship. This seems counterintuitive, as it contradicts the idea that fear of failure reduces engagement in opportunity entrepreneurship (e.g., Wennberg et al., 2013). However, from an attention-based perspective, when confronted with severe climate events, individuals who are typically deterred by fear of failure likely shift their cognitive resources toward collective and urgent needs rather than the perceived personal costs of failing. The main point is that individuals are less likely to perceive the various social, psychological, and financial risks of entrepreneurial failure as major barriers because climate impact and increased uncertainty make them rethink their priorities. For example, the societal stigma attached to entrepreneurial failure should be less pronounced after severe climate impact because evaluations by others are more lenient (e.g., Cassar et al., 2017; Wei et al., 2024). Research on emotional responses to climate impact shows that prosocial behavior, trust, compassion, and solidarity increase (e.g., Cassar et al., 2017; Farny et al., 2019). This reduces the negative psychological effects of entrepreneurial failure by shifting its stigma from a purely personal shortcoming to a shared challenge, encouraging individuals to allocate more attention to problem-solving rather than self-protection. Thus, individuals high in entrepreneurial fear of failure relax their usual vigilance toward the negative consequences of failure and allocate more attention to situations in which they perceive the negative consequences of failure as less damning. This is in line with Wei et al. (2024) who show that individuals high in fear of failure are more likely to allocate attention to social entrepreneurial solutions when climate impact intensifies.

In sum, we expect entrepreneurial fear of failure to positively moderate the relationship between climate impact and engagement in opportunity entrepreneurship. We hypothesize:

H2c: The positive relationship between climate impact and individual engagement in opportunity entrepreneurship will be stronger for individuals high in entrepreneurial fear of failure.

4 Method

4.1 Data and sample

The bulk of our data comes from the Global Entrepreneurship Monitor (GEM)'s adult population survey, which is commonly employed in studies that assess engagement in entrepreneurship (e.g., Boudreaux et al., 2019b; Schade & Schuhmacher, 2022; Ye et al., 2022). The GEM is released yearly since 1999, making it one of the largest comparative sources for global entrepreneurial activities. In line with prior research (e.g., Estrin et al., 2024; Wei et al., 2024), we combine multiple waves of cross-sectional GEM data, yielding a pooled longitudinal sample that covers nine years (2010–2018).[1] Our final sample includes 964,440 individual-level observations from 94 countries. We detail the breakdown of observations per country and year in Table 6 (Appendix). An advantage of our multilevel setup is that the use of unaggregated micro-level data reduces the likelihood of an ecological fallacy problem, which can occur if macro-to-macro observations are transferred to the individual level (e.g., Kim et al., 2016).

We combine the GEM data with macro-level data on climate impact. Specifically, we use the climate risk index (CRI) to capture climate impact per

[1] The beginning of this time frame is determined by the availability of our climate impact data. The GEM data is made available to the public with a time lag, so that the 2018 GEM data was the most recent data available at the time of our data collection.

country and year, which is calculated by Germanwatch (www.germanwatch.org). The CRI quantifies the losses that countries suffer due to extreme weather events related to climate change (e.g., heat waves, storms, floods). Importantly, the CRI does not include rare events (e.g., earthquakes, tsunamis) not directly linked to climate change, making the CRI a precise measure of the occurrence and varied consequences of extreme weather events that can be attributed to anthropogenic climate change (e.g., Eckstein et al., 2021; IPCC, 2021). This precision distinguishes the CRI from other commonly used data sources such as the EM-DAT, which also include events that are unlikely to increase in number or intensify due to climate change. However, while the CRI captures the consequences of extreme weather events, it does not capture the slower, ongoing processes of climate change such as rising sea levels or melting glaciers. Due to its parsimonious nature, various studies that investigate topics related to climate impact leverage Germanwatch data (e.g., Franzke & Torelló I Sentelles, 2020; Hirschmann, 2025). Recently, studies in management and entrepreneurship have also begun to apply CRI data to examine climate impact (e.g., Huang et al., 2017; Ye et al., 2023; Yoon et al., 2024).

We supplement our data with country-level data from the World Bank, the Fraser Institute, and the CIA World Factbook.

4.2 Variables

4.2.1 Dependent variable

Prior GEM research often focusses on total entrepreneurial activities, which encompasses both individuals "who are either a nascent entrepreneur or owner-manager of a new business" (Hill et al., 2022: 194). However, since we are interested in investigating individual engagement in entrepreneurship in the aftermath of climate impact, we focus on nascent entrepreneurial activities and exclude owner-managers because their businesses may be up to 3.5 years old.[2] This approach, which has been applied in other contexts (e.g., Aidis et al., 2008), enhances our theory-measurement fit by ensuring that our dependent variable excludes entrepreneurial activities that where already ongoing at the time of the climate impact.

More specifically, we concentrate on nascent entrepreneurs who are opportunity-motivated. Consistent with prior research, our dependent variable refers to individuals who aim to engage in entrepreneurship to take advantage of a new business opportunity and are thus pulled into entrepreneurship (e.g., Boudreaux et al., 2019b; Estrin et al., 2024). The dependent variable is binary and coded as one if an individual engages in *opportunity entrepreneurship* and zero otherwise. Like Boudreaux et al. (2019b), we exclude necessity entrepreneurs to ensure that the zero category solely comprises non-entrepreneurs.[3]

4.2.2 Independent variable

We use *climate impact (CRI)* as our independent variable. The value for each country and year is calculated based on its rank resulting from the four characteristics considered by the CRI: (i) number of deaths related to natural disasters, (ii) number of deaths per 100,000 inhabitants, (iii) losses in purchasing power parity due to natural disasters in US$, and (iv) losses due to natural disasters per unit of gross domestic product (GDP) (Eckstein et al., 2021). The CRI weights these dimensions as follows:

$$\frac{1}{6} * (i) + \frac{1}{3} * (ii) + \frac{1}{6} * (iii) + \frac{1}{3} * (iv)$$

Hence, the relative components (ii) number of deaths per 100,000 inhabitants and (iv) losses due to natural disasters per unit of GDP are weighted twice as much as the other two components.[4] For example, in 2018, the USA had a CRI of 23.83, which was calculated based on the following subrankings: (i) 6, (ii) 50, (iii) 1, and (iv) 18. Since a lower CRI value indicates a higher climate impact, we multiply the

[2] To identify nascent entrepreneurs, we use the GEM variable "TEAyySTA". This variable equals 1 if the individual is a nascent entrepreneur and 2 if the individual owns a young firm. We keep entrepreneurs if TEAyySTA equals 1, excluding n = 87,665 individuals that are young business owners.

[3] We exclude 18,479 necessity-motivated entrepreneurs and 7,200 entrepreneurs that stated to be both necessity-motivated and opportunity-motivated entrepreneurs. However, our findings are also robust when including these necessity-motivated entrepreneurs in the zero category.

[4] For more information on the CRI and its construction, see https://www.germanwatch.org/en/cri (last accessed: January 17, 2025).

variable by (−1) to make our results more intuitive (e.g., Yoon et al., 2024). Table 6 (Appendix) provides a detailed overview of *climate impact (CRI)* for all countries and years in our sample. We use a one-year time lag for our independent variables to ensure that climate impact precedes our dependent variable.

4.2.3 Moderators

To operationalize *entrepreneurial self-efficacy* (H2a), we use a binary variable that captures the respondent's assessment of whether they perceive themselves as capable of starting a new business. To capture *entrepreneurial alertness* (H2b), we use a binary variable that takes a value of 1 if the respondent sees good opportunities in the next six months to start a new business. Finally, to measure *entrepreneurial fear of failure* (H2c), we use a binary variable that takes a value of 1 if the respondent is generally afraid of failure. These operationalizations align with prior research (e.g., Boudreaux et al., 2019b; Schade & Schuhmacher, 2022). The data come from the GEM.

4.2.4 Control variables

We include an extensive set of control variables at the individual and country level to rule out confounding influences. Our control variables align with recent research that uses comparable empirical setups (e.g., Boudreaux et al., 2019b; Hirschmann et al., 2025; Wei et al., 2024).

At the individual level, we control for *age* and *age squared*, which prior research associates with general engagement in entrepreneurship (e.g., Gentry & Hubbard, 2000; Grilo & Thurik, 2005), and opportunity entrepreneurship specifically (e.g., Boudreaux et al., 2019b). We control for gender (i.e., *female*) and *university degree* because prior research documents that both gender (e.g., Fairlie & Robb, 2009) and education-related human capital (e.g., Davidsson & Honig, 2003) can influence engagement in entrepreneurship. Next, we control for the individual's working status, distinguishing *working status: (i) working, (ii) not working,* and *(iii) retired or student*. This aligns with prior research outlining significant differences in the propensity to engage in entrepreneurship among different employment groups (e.g., Thurik et al., 2008). We account for a potential relation between an individual's resource endowment and engagement in a specific type of entrepreneurship (e.g., Van der Zwan et al., 2016) via *low household income*, which captures whether the respondent is in the lowest 33% of household income in a country's population. Finally, given that the presence of an *entrepreneurial network*, which can serve as a catalyst for engagement in entrepreneurship (e.g., Boudreaux & Nikolaev, 2019).

At the country level, we include *GDP per capita (log.), GDP growth,* and *population (log.)*. GDP per capita reflects the status of economic development, GDP growth indicates the current rate of economic expansion, and population size represents the scale of the internal market. As another important country control variable that has been proven to relate to the likelihood of individuals to engage in opportunity entrepreneurship, we include *unemployment rate* (e.g., Cueto et al., 2015). Next, we also consider *economic freedom index* (e.g., Boudreaux et al., 2019b), which is provided by the Fraser Institute. To account for differences between a country's innovative capability and performance, which could affect the existence and pursuit of entrepreneurial opportunities (e.g., Acs & Varga, 2005), we include the number of *patent applications (log.)*. Finally, we control for a country's *land area (log.)* and *coastal length (log.)*. These geographical characteristics reflect potential entrepreneurship activity but could also capture variations in climate vulnerability (e.g., Hamilton, 2007; Russell & Faulkner, 2004). We include all time variant country-level variables with a time lag of one year.

Table 1 summarizes our variables and provides descriptive statistics.

5 Results

5.1 Descriptive statistics

Table 1 shows that 6.0% of the individuals in our data engage in *opportunity entrepreneurship*, averaged across all countries and years. This value is the same as in Boudreaux et al. (2019b) and Estrin et al. (2024). Table 6 (Appendix) provides further details on the distribution of *opportunity entrepreneurship* across countries and years.

The mean *climate impact (CRI)* is −0.634, ranging from −1.262 (minimum, Barbados in 2012) to −0.022 (maximum, Philippines in 2013). For our

Table 1 Variables, descriptive statistics, and data sources

Variable	Mean	SD	Min	Max	Description	Data source
Dependent variable						
Opportunity entrepreneurship	0.060	0.237	0	1	Dummy variable equal to one if the respondent is currently trying to start a new opportunity-motivated business	GEM (TEAyySTA and TEAyyOPP)
Independent variable and moderators						
Climate impact $(CRI)_{t-1}$	−0.634	0.282	−1.262	−0.022	Continuous variable that captures climate impact per country and year. Calculated based on the climate risk index (CRI), which considers total deaths, deaths per 100 k, the purchasing power losses in million, and losses per unit GDP in %	Germanwatch
Entrepreneurial self-efficacy	0.507	0.500	0	1	Dummy variable equal to one if the respondent perceives themselves capable of starting a new business	GEM (suskill)
Entrepreneurial alertness	0.414	0.493	0	1	Dummy variable equal to one if the respondent sees good opportunities for starting a business in the next six months	GEM (opport)
Entrepreneurial fear of failure	0.408	0.491	0	1	Dummy variable equal to one if fear of failure would prevent the respondent from starting a business	GEM (fearfail)
Individual-level control variables						
Age	40.946	14.335	1	100	Continuous variable that captures the respondent's age	GEM (age)
Age squared	1,882.066	1,267.247	4	10,000	Continuous variable that captures the respondent's squared age	GEM (age^2)
Female	0.488	0.500	0	1	Dummy variable equal to one if the respondent is female	GEM (gender)
University degree	0.237	0.426	0	1	Dummy variable equal to one if the respondent has a university degree	GEM (uneduc)
Working status: working	0.588	0.492	0	1	Dummy variable equal to one if the respondent is currently working	GEM (gemoccu)
Working status: not working	0.239	0.426	0	1	Dummy variable equal to one if the respondent is currently not working (e.g., unemployed)	GEM (gemoccu)
Working status: retired/student	0.145	0.352	0	1	Dummy variable equal to one if the respondent is retired or a student	GEM (gemoccu)
Low household income	0.319	0.466	0	1	Dummy variable equal to one if the respondent is in the bottom 33% of household income in a country	GEM (gemhhinc)
Entrepreneurial network	0.377	0.485	0	1	Dummy variable equal to one if the respondent knows someone who has started a business in the past two years	GEM (knowent)
Year dummies	-	-	-	-	Set of dummy variables that capture the year in which the GEM survey was administered	GEM (yrsurv)
Country-level control variables						
GDP per capita $(log)_{t-1}$	9.957	0.771	7.016	11.974	Continuous variable that captures the country's GDP per capita in USD (per year, log)	World Bank
GDP growth per $capita_{t-1}$	0.017	0.031	−0.100	0.233	Continuous variable that captures the growth rate of the country's GDP per capita (per year)	World Bank
Population $(log)_{t-1}$	17.236	1.572	12.523	21.057	Continuous variable that captures the country's population (per year, log)	World Bank
$Unemployment_{t-1}$	0.093	0.064	0.001	0.280	Continuous variable that captures the unemployment rate in the country (per year)	World Bank
Economic $freedom_{t-1}$	7.259	0.768	3.780	8.760	Continuous variable that captures the economic freedom index in the country (per year)	Fraser Institute
Patent applications $(log)_{t-1}$	6.586	3.193	0	14.035	Continuous variable that captures the country's resident patent applications (per year, log)	World Bank
Land area (log)	12.892	1.808	6.064	16.611	Continuous variable that captures the country's land area in km^2 (log)	CIA World Factbook
Coastline length (log)	8.147	2.891	0	12.489	Continuous variable that captures the country's coastline length in km	CIA World Factbook

n = 964,440. For the Global Entrepreneurship Monitor (GEM) data, the terms in brackets indicate the variables used

Table 2 Correlations and variance inflations factors (VIFs)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	VIF
(1) Opportunity entrepreneurship																						
(2) Climate impact $(CRI)_{t-1}$	0.004																					1.535
(3) Age	−0.072	0.004																				1.163
(4) Age squared	−0.076	0.004	0.983																			-
(5) Female	−0.053	0.022	0.014	0.014																		1.049
(6) University degree	0.038	−0.035	−0.016	−0.026	−0.012																	1.089
(7) Working status: working	−0.066	−0.041	0.147	0.139	−0.118	0.123																1.489
(8) Working status: not working	0.113	0.060	0.062	0.042	0.133	−0.103	−0.670															-
(9) Working status: retired/student	−0.042	0.003	−0.279	−0.241	0.021	−0.059	−0.492	−0.230														1.487
(10) Low household income	−0.054	−0.027	0.052	0.067	0.071	−0.183	−0.088	0.019	0.103													1.091
(11) Entrepreneurial network	0.146	−0.018	−0.114	−0.122	−0.075	0.061	−0.033	0.061	−0.030	−0.098												1.123
(12) Entrepreneurial self-efficacy	0.176	−0.017	−0.035	−0.050	−0.123	0.062	−0.074	0.114	−0.038	−0.082	0.235											1.155
(13) Entrepreneurial alertness	0.138	−0.015	−0.075	−0.071	−0.049	0.038	−0.027	0.055	−0.030	−0.068	0.213	0.205										1.130

Table 2 (continued)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	VIF
(14) Entrepreneurial fear of failure	−0.078	0.012	−0.002	−0.012	0.070	0.005	0.042	−0.050	0.009	0.027	−0.039	−0.149	−0.096									1.039
(15) GDP per capita $(\log)_{t-1}$	−0.079	−0.158	0.187	0.181	−0.018	0.170	0.270	−0.236	−0.071	−0.004	−0.114	−0.118	−0.103	0.068								3.284
(16) GDP growth per capita_{t-1}	0.031	0.076	−0.052	−0.052	0.005	−0.035	−0.043	0.064	−0.037	0.041	0.037	−0.013	0.068	−0.025	−0.233							1.424
(17) Population $(\log)_{t-1}$	−0.033	0.512	−0.033	−0.037	−0.009	−0.036	−0.086	0.095	−0.009	0.016	0.006	−0.048	−0.027	0.011	−0.233	0.159						6.270
(18) Unemployment $(\%)_{t-1}$	−0.062	−0.018	0.047	0.034	0.002	−0.009	−0.027	−0.080	0.139	0.018	−0.066	−0.020	−0.163	0.060	0.123	−0.235	−0.075					1.150
(19) Economic freedom_{t-1}	−0.029	−0.067	0.180	0.181	0.006	0.089	0.195	−0.161	−0.061	0.000	−0.091	−0.069	−0.059	0.030	0.620	−0.090	−0.295	0.089				1.884
(20) Patent applications $(\log)_{t-1}$	−0.091	0.288	0.115	0.107	−0.009	0.076	0.110	−0.087	−0.049	0.007	−0.090	−0.148	−0.121	0.060	0.391	−0.017	0.659	0.051	0.160			4.234
(21) Land area (log)	0.005	0.452	−0.028	−0.024	0.000	−0.035	−0.078	0.072	0.011	0.008	0.027	−0.002	0.039	−0.013	−0.229	0.123	0.788	−0.009	−0.333	0.477		3.264
(22) Coastline length (log)	−0.023	0.261	0.038	0.039	−0.004	0.054	0.016	0.001	−0.024	−0.001	−0.024	−0.042	−0.003	0.013	0.142	0.015	0.493	−0.006	−0.013	0.436	0.561	1.704

$n = 964{,}440$. VIFs are calculated based on Model 2 of Table 3 (without country dummies) socio-cognitive characteristics, we find that 50.7% of the individuals are convinced that they have sufficient entrepreneurial skills to start a new business (*entrepreneurial self-efficacy*), 41.4% see a good opportunity to start a new business in the next 6 months (*entrepreneurial alertness*), and 40.8% report that *entrepreneurial fear of failure* prevents them from starting a new business.

Our individual-level controls show that the individuals are on average 40.9 years old and that 48.8% are female. 23.7% of the individuals have a university degree. Most of the individuals (58.8%) work, while 14.5% are retirees or students. 31.9% of the individuals belong to the lowest 33% in terms of national household income and 37.7% of the individuals report having an entrepreneurial network. Regarding the country-level control variables, the mean GDP per capita is 27,045 USD (log. = 9.957), the average GDP growth rate per capita is 1.7%, and the population size is 109 million (log. = 17.236). Moreover, the average unemployment rate is 9.3%, the mean of the economic freedom index is 7.3, and the average number of patent applications per country and year is 30,838 (log. = 6.586). Finally, the geographical variables show a mean of 1,532,745 km^2 (log. = 12.892) for the land area of the countries and 20,149 km (log. = 8.147) for the coastline of the countries.

Table 2 presents our correlation matrix as well as the variance inflation factors (VIFs), which indicate that multicollinearity does not appear to be a serious issue.

5.2 Main results

We employ multilevel analyses because our data is hierarchically structured with individuals nested within countries. Specifically, we use mixed-effects logistic regression analysis, a robust statistical method suitable for dichotomous outcomes. This estimation technique allows us to estimate the impact of the country-level variable *climate impact (CRI)* (level 2) on individuals' propensity to engage in *opportunity entrepreneurship* (level 1). Recognizing that each country has unique characteristics that might influence *opportunity entrepreneurship*, we incorporate random effects to account for unobserved country-specific factors by allowing both the baseline likelihood of *opportunity entrepreneurship* and the influence of other predictors to vary across countries (e.g., Martin et al., 2007). Additionally, we control for temporal variations by including year dummies. Moreover, by using a lagged measure of *climate impact (CRI)*, we reduce the potential for endogeneity due to reverse causality (e.g., Podsakoff et al., 2012). Also, from a content perspective, nascent opportunity entrepreneurship is unlikely to drive significant or immediate changes in a country's climate impact, which is an extrinsic, inherently slow, and global-scale phenomenon. As a result, the behavior of any single individual should have a negligible effect on macro-level climate indicators, thereby rendering both our main and interaction effects much less susceptible to reverse-causality biases.

We first test for sufficient variation at level 1 and level 2 (between-group variance) by estimating interclass correlations (ICCs). The null model in our main analysis (all independent and control variables omitted, calculating only the intercept) demonstrates that 86.6% of the variance in our data is at the individual level (level 1), while 13.4% is at the country level (level 2). These results are in line with best practice recommendations (e.g., Aguinis et al., 2013) and align with prior multilevel studies in entrepreneurship (e.g., Boudreaux et al., 2019b; Schade & Schuhmacher, 2022). Second, we include our individual- and country-level control variables in Model 1 of Table 3, which serves as our baseline model. Third, we add our main independent variable in Model 2, before including our interaction terms between *climate impact (CRI)* and *entrepreneurial self-efficacy* (H2a), *entrepreneurial alertness* (H2b), and *entrepreneurial fear of failure* (H2c) in Models 3 to 6.

Our baseline model (Model 1) shows positive effects of *age* (coeff. = 0.039, $p < 0.001$), *university degree* (coeff. = 0.277, $p < 0.001$), and *entrepreneurial network* (coeff. = 0.737, $p < 0.001$) on *opportunity entrepreneurship*. Moreover, we find negative associations between *age squared* (coeff. = −0.001, $p < 0.001$), *female* (coeff. = −0.350, $p < 0.001$), and *low household income* (coeff. = −0.217, $p < 0.001$) and *opportunity entrepreneurship*. Furthermore, the baseline effects of our socio-cognitive characteristics align with those reported in prior research (e.g., Estrin et al., 2024; Schade & Schuhmacher, 2022). *Entrepreneurial self-efficacy* (coeff. = 1.292, $p < 0.001$) and *alertness to opportunities* (coeff.

Table 3 Main analysis (dependent variable: opportunity entrepreneurship)

Model	(1)		(2)			(3)		(4)		(5)		(6)	
Statistic	Coeff	(SE)	Coeff	(SE)	[ME]	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)
Individual-level control variables													
Age	0.039	(0.002)***	0.039	(0.002)***	[0.001]	0.040	(0.002)***	0.039	(0.002)***	0.039	(0.002)***	0.039	(0.002)***
Age squared	−0.001	(0.000)***	−0.001	(0.000)***	[−0.000]	−0.001	(0.000)***	−0.001	(0.000)***	−0.001	(0.000)***	−0.001	(0.000)***
Female	−0.350	(0.010)***	−0.350	(0.010)***	[−0.011]	−0.350	(0.010)***	−0.350	(0.010)***	−0.350	(0.010)***	−0.350	(0.010)***
University degree	0.277	(0.011)***	0.277	(0.011)***	[0.009]	0.276	(0.011)***	0.276	(0.011)***	0.277	(0.011)***	0.277	(0.011)***
Working status: working	−0.702	(0.010)***	−0.702	(0.010)***	[−0.022]	−0.702	(0.010)***	−0.702	(0.010)***	−0.702	(0.010)***	−0.702	(0.010)***
Working status: retired/student	−1.026	(0.018)***	−1.025	(0.018)***	[−0.032]	−1.025	(0.018)***	−1.025	(0.018)***	−1.025	(0.018)***	−1.025	(0.018)***
Low household income	−0.217	(0.011)***	−0.216	(0.011)***	[−0.007]	−0.216	(0.011)***	−0.216	(0.011)***	−0.216	(0.011)***	−0.217	(0.011)***
Entrepreneurial network	0.737	(0.010)***	0.737	(0.010)***	[0.023]	0.737	(0.010)***	0.737	(0.010)***	0.737	(0.010)***	0.737	(0.010)***
Entrepreneurial self-efficacy	1.292	(0.013)***	1.292	(0.013)***	[0.041]	1.149	(0.029)***	1.293	(0.013)***	1.292	(0.013)***	1.172	(0.029)***
Entreprenuerial alertness	0.583	(0.010)***	0.583	(0.010)***	[0.018]	0.584	(0.010)***	0.506	(0.023)***	0.583	(0.010)***	0.524	(0.024)***
Entrepreneurial fear of failure	−0.348	(0.011)***	−0.348	(0.011)***	[−0.011]	−0.348	(0.011)***	−0.348	(0.011)***	−0.220	(0.024)***	−0.234	(0.024)***
Year dummies	Yes		Yes			Yes		Yes		Yes		Yes	
Country-level control variables													
GDP per capita $(\log)_{t-1}$	0.177	(0.059)**	0.174	(0.059)**	[0.005]	0.173	(0.059)**	0.172	(0.059)**	0.174	(0.059)**	0.172	(0.059)**
GDP growth per capita_{t-1}	0.515	(0.227)*	0.584	(0.228)*	[0.018]	0.588	(0.228)*	0.572	(0.228)*	0.566	(0.228)*	0.562	(0.228)*
Population $(\log)_{t-1}$	−0.103	(0.053)	−0.108	(0.053)*	[−0.003]	−0.109	(0.053)*	−0.110	(0.053)*	−0.109	(0.053)*	−0.110	(0.053)*
$\text{Unemployment}_{t-1}$	−0.719	(0.361)*	−0.690	(0.361)	[−0.022]	−0.696	(0.361)	−0.699	(0.361)	−0.714	(0.361)*	−0.722	(0.361)*
Economic freedom_{t-1}	−0.146	(0.037)***	−0.138	(0.037)***	[−0.004]	−0.139	(0.037)***	−0.137	(0.037)***	−0.137	(0.037)***	−0.136	(0.037)***
Patent applications $(\log)_{t-1}$	−0.012	(0.006)*	−0.012	(0.006)*	[−0.000]	−0.012	(0.006)*	−0.012	(0.006)*	−0.012	(0.006)*	−0.011	(0.006)*
Land area (log)	0.056	(0.044)	0.055	(0.043)	[−0.002]	0.054	(0.043)	0.055	(0.043)	0.055	(0.043)	0.054	(0.043)
Coastline length (log)	−0.024	(0.021)	−0.025	(0.021)	[−0.001]	−0.024	(0.021)	−0.024	(0.021)	−0.025	(0.021)	−0.024	(0.021)
Independent variable and interactions													
Climate impact $(\text{CRI})_{t-1}$ (H1)			0.077	(0.024)**	[0.002]	0.273	(0.043)***	0.159	(0.033)***	0.023	(0.026)	0.256	(0.049)***
Climate impact $(\text{CRI})_{t-1}$ × entr. self-efficacy (H2a)						−0.233	(0.043)***	-		-		−0.196	(0.043)***
Climate impact $(\text{CRI})_{t-1}$ × entr. alertness (H2b)								−0.123	(0.034)***	-		−0.094	(0.034)**
Climate impact $(\text{CRI})_{t-1}$ × entr. fear of failure (H2c)										0.207	(0.035)***	0.183	(0.036)***
Observations (countries)	964,440 (94)		964,440 (94)			964,440 (94)		964,440 (94)		964,440 (94)		964,440 (94)	
Chi^2	43,184.640		43,193.167			43,161.645		43,195.356		43,207.927		43,177.568	
Log Likelihood	−177,643.184		−177,638.096			−177,622.997		−177,631.397		−177,620.934		−177,605.125	
AIC[a]	355,344.367		355,336.191			355.307,994		355,324.794		355,303.868		355,276.251	

This table displays the results of multilevel (mixed-effects) logistic regression analyses. The reference group for working status is "not working". [a] AIC = Akaike's information criterion. Standard errors (SE) in parentheses, marginal effects [ME] in square brackets in Model 2. † $p < 0.1$,* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-tailed)

= 0.583, $p < 0.001$) relate positively to *opportunity entrepreneurship*, while *fear of failure* has a negative effect (coeff. = −0.348, $p < 0.001$). Regarding the country-level variables, our findings show that *GDP per capita (log.)* (coeff. = 0.177, $p < 0.01$) and *GDP growth per capita* (coeff. = 0.515, $p < 0.05$), positively affect *opportunity entrepreneurship*, while we find a negative effect between *economic freedom* and *opportunity entrepreneurship* (coeff. = −0.146, $p < 0.001$). *Unemployment rate* is negatively correlated with *opportunity entrepreneurship* (coeff. = −0.719, $p < 0.05$), as is *patent applications (log.)* (coeff. = −0.012, $p < 0.05$).

Model 2 adds our main variable of interest. Consistent with H1, we find a positive and statistically significant relation between *climate impact (CRI)* and *opportunity entrepreneurship* (coeff. = 0.077, $p < 0.01$), indicating that a higher climate impact stimulates engagement in opportunity entrepreneurship. This effect is robust across all models in Table 3. The marginal effect suggests that *climate impact (CRI)* has a positive but modest impact, with a 0.2 percentage point increase in the likelihood of engaging in *opportunity entrepreneurship* for each unit increase in *climate impact (CRI)*. Other studies suggest that marginal effects of comparable magnitude are common in large scale cross-sectional analyses. For example, Schade and Schuhmacher (2022) investigate the level of digital infrastructure in a country and find a margin on total entrepreneurial activities of 0.46 percentage points increase for each unit increase. Finally, calculating the odds ratios suggests that for each one-unit increase in the *climate impact (CRI)*, the odds of engaging in *opportunity entrepreneurship* are expected to increase by approximately 7.3%.

To illustrate the economic significance of these results, we translate the odds ratio into a population-level interpretation (e.g., Boudreaux et al., 2019a, b). A one standard deviation increase in *climate impact (CRI)* (0.282 units) corresponds to a 2.0% increase in the odds of engaging in opportunity entrepreneurship, based on the exponential transformation of the odds ratio ($1.073^{0.282} \approx 1.02$). Extrapolating this to Germany, where 3.2% of the population (approximately 2.656 million individuals out of 83 million) are classified as opportunity entrepreneurs,[5] such an increase in climate impact would imply the emergence of around 53,120 additional opportunity entrepreneurs. In countries of the Global South, where climate impacts are often more pronounced and entrepreneurial activity is higher, the absolute effect is even greater. For example, in Nigeria, with a population of 227.9 million and an estimated 19.7% engaged in opportunity entrepreneurship (around 44.9 million individuals), the same one standard deviation increase in CRI would correspond to approximately 898,000 additional opportunity entrepreneurs. While these projections are based on illustrative examples and assume constant effects across individuals, they help demonstrate that even modest shifts in climate impact can translate into economically meaningful changes at the population level.

We then enter the interaction terms to assess H2. Focusing on the full Model 6, the results support H2a, suggesting that *entrepreneurial self-efficacy* negatively moderates the relationship between *climate impact (CRI)* and *opportunity entrepreneurship* (coeff. = −0.196, $p < 0.001$). In line with H2b (Model 4), we find that the positive relationship between *climate impact (CRI)* and *opportunity entrepreneurship* is also reduced if an individual is high in *entrepreneurial alertness* (coeff. = −0.094, $p < 0.01$). Finally, the results of Model confirm H2c, suggesting that *entrepreneurial fear of failure* positively moderates the main relationship (coeff. = 0.183, $p < 0.001$).

We graphically illustrate the interaction effects in Fig. 1b. The plots illustrate the predicted probability for *opportunity entrepreneurship* (with 95% confidence intervals) by using marginal effects for each moderator that range from ± 1 SD. This approach is consistent with best practice recommendations for investigating interaction effects calling for a graphical representation of interaction terms (e.g., Murphy & Aguinis, 2022). Figure 1a supports H2a, as the graph increases significantly less for individuals with entrepreneurial self-efficacy than the graph for individuals without entrepreneurial self-efficacy, with higher values for *climate impact (CRI)*. Figure 1b supports H2b by illustrating a steeper slope for individuals without alertness to opportunities. Finally, Fig. 1c confirms the finding regarding H2c. While the graph shows that individuals with fear of failure generally engage in fewer opportunity-motivated entrepreneurial activities, the slope increases much stronger as *climate impact (CRI)* increases, compared to individuals

[5] Opportunity entrepreneurship percentage calculated based on the total values in Table A1 (i.e., 813/25,182 = 0.032).

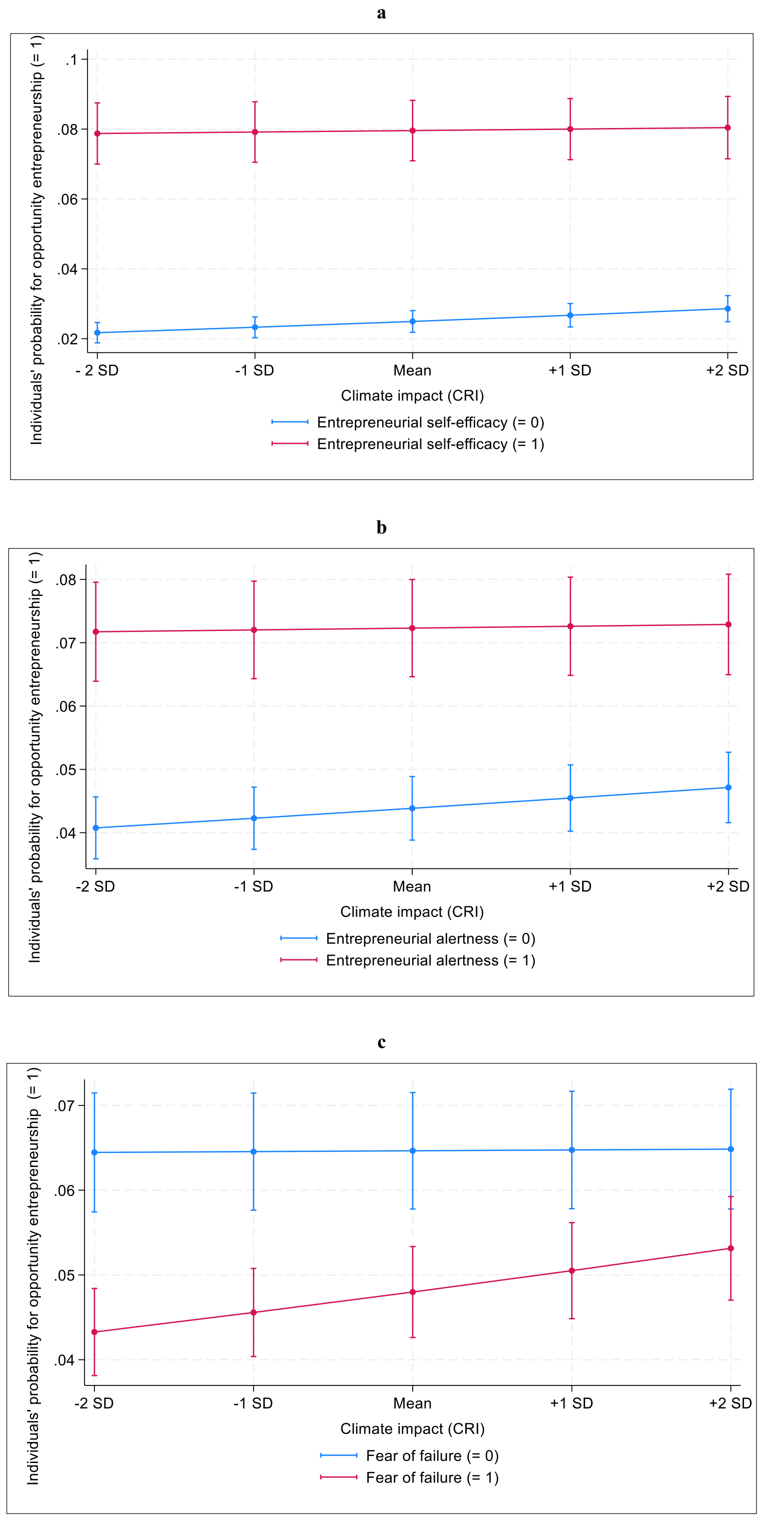

Fig. 1 a. Interaction between climate impact (CRI) and entrepreneurial self-efficacy (H2a). **b**. Interaction between climate impact (CRI) and entrepreneurial alertness (H2b). **c**. Interaction between climate impact (CRI) and entrepreneurial fear of failure (H2c)

Table 4 Further analysis: considering the interaction of climate impact with gender, education, and entrepreneurial network (dependent variable: opportunity entrepreneurship)

Model	(1)		(2)		(3)		(4)	
Statistic	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)
Individual-level control variables								
Age	0.039	(0.002)***	0.040	(0.002)***	0.040	(0.002)***	0.040	(0.002)***
Age squared	−0.001	(0.000)***	−0.001	(0.000)***	−0.001	(0.000)***	−0.001	(0.000)***
Female	−0.299	(0.022)***	−0.350	(0.010)***	−0.350	(0.010)***	−0.298	(0.022)***
University degree	0.277	(0.011)***	0.222	(0.025)***	0.276	(0.011)***	0.221	(0.025)***
Working status: working	−0.702	(0.010)***	−0.702	(0.010)***	−0.702	(0.010)***	−0.701	(0.010)***
Working status: retired/student	−1.025	(0.018)***	−1.025	(0.018)***	−1.025	(0.018)***	−1.024	(0.018)***
Low household income	−0.217	(0.011)***	−0.217	(0.011)***	−0.217	(0.011)***	−0.217	(0.011)***
Entrepreneurial network	0.736	(0.010)***	0.737	(0.010)***	0.755	(0.023)***	0.761	(0.023)***
Entrepreneurial self-efficacy	1.292	(0.013)***	1.292	(0.013)***	1.292	(0.013)***	1.292	(0.013)***
Entrepreneurial alertness	0.583	(0.010)***	0.583	(0.010)***	0.583	(0.010)***	0.583	(0.010)***
Entreprneeurial fear of failure	−0.348	(0.011)***	−0.348	(0.011)***	−0.348	(0.011)***	−0.348	(0.011)***
Year dummies	Yes		Yes		Yes		Yes	
Country-level control variables								
GDP per capita $(log)_{t-1}$	0.166	(0.058)**	0.165	(0.058)**	0.165	(0.058)**	0.167	(0.058)**
GDP growth per $capita_{t-1}$	0.591	(0.228)**	0.589	(0.228)**	0.587	(0.228)*	0.590	(0.228)**
Population $(log)_{t-1}$	−0.110	(0.054)*	−0.109	(0.054)*	−0.110	(0.054)*	−0.109	(0.054)*
$Unemployment_{t-1}$	−0.887	(0.359)*	−0.884	(0.359)*	−0.887	(0.359)*	−0.883	(0.359)*
Economic $freedom_{t-1}$	−0.134	(0.037)***	−0.134	(0.037)***	−0.134	(0.037)***	−0.134	(0.037)***
Patent applications $(log)_{t-1}$	−0.012	(0.006)*	−0.012	(0.006)*	−0.012	(0.006)*	−0.012	(0.006)*
Land area (log)	0.056	(0.044)	0.056	(0.044)	0.056	(0.044)	0.057	(0.044)
Coastline length (log)	−0.024	(0.021)	−0.024	(0.021)	−0.024	(0.021)	−0.024	(0.021)
Independent variable and interactions								
Climate impact $(CRI)_{t-1}$	0.027	(0.027)	0.081	(0.026)**	0.047	(0.031)	0.029	(0.035)
Climate impact $(CRI)_{t-1}$ × female	0.082	(0.032)**	-		-		0.084	(0.032)**
Climate impact $(CRI)_{t-1}$ × university degree			−0.076	(0.035)*	-		−0.078	(0.035)*
Climate impact $(CRI)_{t-1}$ × entr. network					0.021	(0.032)	0.031	(0.032)
Observations (countries)	964,440 (94)		964,440 (94)		964,440 (94)		964,440 (94)	
Chi^2	43,178.820		43,179.256		43,179.793		43,184.741	
Log Likelihood	−177,669.468		−177,670.482		−177,672.586		−177,666.688	
AIC[a]	355,400.937		355,402.963		355,407.173		355,399.377	

This table displays the results of multilevel (mixed-effects) logistic regression analyses. The reference group for working status is “not working”. [a] AIC = Akaike’s information criterion. Standard errors (SE) in parentheses. † $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two tailed tests) without entrepreneurial fear of failure, for whom the graph remains almost on one level.

5.3 Further analyses

5.3.1 Additional dependent variables and moderators

In our first set of further analyses (Table 7, Appendix), we explore additional dependent variables and moderators of interest. First, in Model 1, we shift our focus from opportunity to necessity entrepreneurship by excluding opportunity entrepreneurs from our sample, and then using necessity entrepreneurship as our dependent variable ($n = 18{,}479$). The results indicate that although the positive relationship between *climate impact (CRI)* and engagement in entrepreneurship persists, it does not meet common thresholds for statistical significance (coeff. $=0.096$, $p =$ 0.206). This also applies to the socio-cognitive characteristics, which lose in statistical significance when compared to our main analysis. Taken together, these results suggest that climate impact does not universally elevate individual engagement in entrepreneurship as the influence appears to be more pronounced for opportunity entrepreneurship.

In Model 2, we assess whether the effect of *climate impact (CRI)* is shaped by the country's geographic size. The reasoning behind this analysis is that in larger countries (e.g., US), a higher climate impact could affect the allocation of attention to climate issues, and hence, engagement in entrepreneurship, less severely than in smaller countries (e.g., Luxembourg), where a single climate change-induced event may affect a larger portion of the population simply due to the country's smaller size. While we do include country size (*land area (log.)*) as a control variable in all our analyses, we try to assess potential differences in more detail additionally including *land area (log.)* as a moderator. However, the results in Model 2 do not show any statistically significant differences (coeff. $=0.006$, $p = 0.627$), so that the attentional effect of climate impact on individuals might not differ strongly between countries with different sizes, at least when investigating the average effect across many countries and years.

In Model 3, we investigate whether the effect of *climate impact (CRI)* depends on whether the individual engages in opportunity entrepreneurship in an industry that can be considered as vulnerable to climate impact. Previous studies describe industries with substantial fixed assets that cannot easily be relocated as particularly vulnerable, as well as industries that rely on consistent weather patterns for success (e.g., Wilbanks et al., 2007). Following Huang et al. (2017), we classify the following sectors as vulnerable: (a) agriculture, forestry, hunting, and fishing; (b) mining and construction; (c) manufacturing; and (d) utilities, transport, storage, and communications. We include the resulting dummy variable *vulnerable industry* as an interaction effect, but do not find a pronounced effect (coeff. $=-0.058$, $p = 0.720$). This finding suggests that an increase in *climate impact (CRI)* does not seem to differently relate to *opportunity entrepreneurship* in climate-vulnerable and non-climate-vulnerable industries.

Finally, in Model 4, we assess the effect of climate impact on *social opportunity entrepreneurship* as an alternative dependent variable. This analysis is constrained to the 2015 wave of the GEM survey, which includes specific questions on social entrepreneurship. This restriction reduces our sample to 110,326 individuals from 57 countries, 2,802 (2.5%) of whom identified as currently trying to start a social venture prompted by a perceived opportunity. Our results indicate that climate impact does not significantly affect these social entrepreneurship efforts. Also, no statistically significant moderation effects emerge. The absence of statistically significant findings in the social entrepreneurship sub-sample could imply that the overall impact observed in our main analyses is not merely driven by a subset of socially oriented entrepreneurs. Instead, climate impact may broadly influence the entrepreneurial ecosystem, stimulating opportunity entrepreneurship beyond purely social entrepreneurship contexts. A second explanation for the non-findings might be data related. That is, a more pronounced longitudinal design would be necessary to capture the potentially nuanced and time-variant effects of climate impact on social entrepreneurship.

5.3.2 Further conceptual considerations: gender, human capital, and social capital

Our main analysis focusses on socio-cognitive characteristics as moderators. However, prior research indicates that other personal factors outside SCT's scope could also shape how individuals allocate their attention and react to external events. Potential candidates for such additional moderators that may affect the attention individuals pay to climate impact are gender (e.g., Baughn et al., 2006; Shane et al., 1991), human capital (e.g., Colombo & Grilli, 2010; Estrin et al., 2016), and social capital (e.g., Kwon & Arenius, 2010; Stam et al., 2014). To provide a more comprehensive account of how individual attributes affect the climate-entrepreneurship nexus, which may yield significant insights for economic policymakers, we thus conduct a second set of further analyses (Table 4) in which we include *female*, *university education*, and *entrepreneurial network* as moderators.

The results in Model 1 show that *female* positively moderates the association between *climate impact (CRI)* and *opportunity entrepreneurship* (coeff. $=0.082$, $p < 0.01$), suggesting that the attention towards engaging in *opportunity entrepreneurship* intensifies more notably among women as climate impact increases. In Model 2, we find that more human capital (*university degree*) interacts negatively with climate impact (coeff. $=-0.076$, $p < 0.01$). Thus, in countries with higher climate impact, individuals with lower human capital are more likely to engage in opportunity entrepreneurship. Finally, Model 3 shows that social capital (*entrepreneurial network*) does not seem to affect the relation between *climate impact (CRI)* and *opportunity entrepreneurship* in a statistically significant way.

5.4 Robustness tests

We perform a range of robustness tests that consider alternative estimation techniques, lag structures, and additional control variables. Table 5 demonstrates our robustness test findings.

Model 1 employs a correlated random effects (CRE) approach (e.g., Boudreaux et al., 2019b; Schade & Schuhmacher, 2022) that includes all mean values of our individual-level control variables per country. The results show that all our effects of interest remain similar in magnitude and statistical significance.

Model 2 uses a logistic regression approach that includes country and year dummies to control for unobserved country heterogeneity and common temporal trends. Additionally, we employ cluster-robust standard errors to correct for a potential within-country correlation of observations. Again, the findings corroborate our main results.

In Model 3, we apply linear probability modeling (LPM) as a complementary estimation strategy similar to prior multilevel studies (e.g., Schade & Schuhmacher, 2022). Specifically, we use a traditional linear regression model with a binary dependent variable and include country and year dummies as well as cluster-robust standard errors. While the effects of *climate impact (CRI)* and the moderation with *entrepreneurial fear of failure* remain robust, the moderation with *entrepreneurial self-efficacy* and *entrepreneurial alertness* lose in statistical significance.

Model 4 assesses whether our results change with a two-year lag of our country-level variables. This allows us to control for longer time-dependent changes and assesses the consistency of the attentional effect of climate impact on *opportunity entrepreneurship* over a longer time period. Again, our findings remain relatively unchanged, but the moderation of *entrepreneurial alertness* loses in statistical significance. These results further reduce concerns regarding reverse-causality-driven endogeneity, suggesting that our observed relationships are not merely artifacts of shorter-term fluctuations. By demonstrating consistent effects even when using a two-year lag, our approach provides greater confidence in the causal interpretation of the link between climate impact and opportunity entrepreneurship.

Finally, in Model 5, we include another set of controls from the doing business dataset of the World Bank (e.g., Thai & Turkina, 2014). Specifically, we include the variables *starting a business score* and *getting credit score*. While both variables affect the likelihood of an individual to engage in *opportunity entrepreneurship*, our main results remain consistent.

6 Discussion

6.1 Implications for research

We document that climate impact can spur individual engagement in opportunity entrepreneurship. Thus, our results extend the growing literature on entrepreneurship in the aftermath of adverse climate events. While qualitative research in this area suggests that climate impact can stimulate entrepreneurship (e.g., Farny et al., 2019; Kaesehage et al., 2019; Williams

Table 5 Robustness tests: considering different estimation techniques, lags, and additional control variables (dependent variable: opportunity entrepreneurship)

Description	CRE		Country dummies		LPM		Two-year lag		Additional CVs	
Model	(1)		(2)		(3)		(4)		(5)	
Statistic	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)
Individual-level control variables										
Age	0.040	(0.002)***	0.040	(0.002)***	0.000	(0.000)**	0.038	(0.002)***	0.041	(0.002)***
Age squared	−0.001	(0.000)***	−0.001	(0.000)***	−0.000	(0.000)***	−0.001	(0.000)***	−0.001	(0.000)***
Female	−0.358	(0.010)***	−0.350	(0.010)***	−0.018	(0.000)***	−0.345	(0.010)***	−0.351	(0.010)***
University degree	0.282	(0.011)***	0.278	(0.011)***	0.015	(0.001)***	0.269	(0.011)***	0.287	(0.011)***
Working status: working	−0.727	(0.010)***	−0.702	(0.011)***	−0.044	(0.001)***	−0.719	(0.011)***	−0.697	(0.011)***
Working status: retired/student	−1.047	(0.018)***	−1.026	(0.018)***	−0.060	(0.001)***	−1.090	(0.019)***	−1.003	(0.018)***
Low household income	−0.222	(0.012)***	−0.216	(0.012)***	−0.008	(0.000)***	−0.221	(0.012)***	−0.222	(0.012)***
Entrepreneurial network	0.746	(0.010)***	0.737	(0.010)***	0.042	(0.001)***	0.745	(0.010)***	0.737	(0.010)***
Entrepreneurial self-efficacy	1.167	(0.029)***	1.171	(0.030)***	0.050	(0.001)***	1.123	(0.031)***	1.213	(0.032)***
Entrepreneurial alertness	0.534	(0.024)***	0.524	(0.024)***	0.029	(0.001)***	0.603	(0.025)***	0.475	(0.026)***
Entrepreneurial fear of failure	−0.239	(0.024)***	−0.234	(0.025)***	−0.013	(0.001)***	−0.257	(0.026)***	−0.282	(0.027)***
Year dummies	Yes		Yes		Yes		Yes		Yes	
Country-level control variables										
GDP per capita $(\log)_{t-1}$	0.027	(0.059)	0.373	(0.092)***	0.035	(0.005)***	0.075	(0.063)	0.247	(0.068)***
GDP growth per capita_{t-1}	0.564	(0.240)*	0.424	(0.243)†	0.004	(0.012)	−0.895	(0.224)***	0.470	(0.242)†
Population $(\log)_{t-1}$	0.023	(0.053)	−0.488	(0.276)†	0.038	(0.014)**	−0.103	(0.051)*	−0.141	(0.061)*
$\text{Unemployment}_{t-1}$	−0.740	(0.378)†	−0.181	(0.390)	−0.019	(0.015)	−1.211	(0.380)**	−0.801	(0.381)*
Economic freedom_{t-1}	−0.100	(0.037)**	−0.193	(0.040)***	−0.018	(0.002)***	0.127	(0.039)**	−0.197	(0.039)***
Patent applications $(\log)_{t-1}$	−0.008	(0.006)	−0.010	(0.006)†	−0.001	(0.000)***	−0.013	(0.006)*	−0.002	(0.007)
Land area (log)	0.001	(0.043)	-		0.059	(0.007)***	0.076	(0.040) †	0.084	(0.049)†
Costal length (log)	−0.024	(0.021)	-		0.022	(0.013)	−0.013	(0.020)	−0.034	(0.023)
Starting a business score_{t-1}									−0.006	(0.001)***
Getting credit score_{t-1}									0.008	(0.002)***
Country dummies	No		Yes		Yes		No		No	
Country means	Yes		No		No		No		No	
Independent variable and interactions										
Climate impact $(\text{CRI})_{t-1}$	0.231	(0.049)***	0.252	(0.049)***	0.004	(0.002)**	0.185	(0.052)***	0.287	(0.053)***
Climate impact $(\text{CRI})_{t-1} \times$ entr. self-efficacy	−0.183	(0.043)***	−0.197	(0.044)***	0.001	(0.002)	−0.263	(0.046)***	−0.157	(0.046)***
Climate impact $(\text{CRI})_{t-1} \times$ entr. alertness	−0.073	(0.034)*	−0.094	(0.034)**	−0.003	(0.002)†	0.039	(0.037)	−0.145	(0.036)***
Climate impact $(\text{CRI})_{t-1} \times$ entr. fear of failure	0.177	(0.036)***	0.182	(0.036)***	0.007	(0.002)***	0.121	(0.038)**	0.134	(0.038)***

Table 5 (continued)

Description	CRE		Country dummies		LPM		Two-year lag		Additional CVs	
Model	(1)		(2)		(3)		(4)		(5)	
Statistic	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)
Observations (countries)	964,440 (94)		964,440 (94)		964,440 (94)		873,607 (94)		859,252 (90)	
Chi^2	43,764.217		68,284.021		-		39,985.793		39,168.375	
Log Likelihood	−177,229.083		−177,328.170		63,124.109		−162,761.287		−159,556.923	
AIC[a]	354,544.166		354,904.340		−126,000.218		325,588.573		319,183.845	

Model 1 uses a correlated random effects (CRE) model that additionally includes mean averages of our individual level variables per country. Model 2 is a logistic regression with country and year dummies as well as cluster-robust standard errors (clustered at the country-level). Model 3 is a linear probability model (LPM) with cluster-robust standard errors (clustered at the country level). In Model 4, all variables that are lagged by one year in the other models are lagged by two years (i.e., t-2 instead of t-1). Model 5 includes additional country-level control variables (i.e., "starting a business score" and "getting credit score" from the World Bank's "Doing Business" dataset. The reference group for working status is "not working". Standard errors in parentheses. AIC = Akaike's information criterion. † $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-tailed tests)

& Shepherd, 2016a), prior quantitative research is ambiguous, with studies suggesting a positive (Wei et al., 2024; Ye et al., 2023), neutral (Boudreaux et al., 2023), and negative association (Boudreaux et al., 2019a, 2022; Cordero, 2023) between entrepreneurship and climate impact. By focusing on opportunity entrepreneurship, our findings bring greater clarity to this debate by showing that these contrasting results may stem from differences in the types of entrepreneurs examined (e.g., opportunity entrepreneurs), who may respond to climate impact in distinct ways. Additionally, by employing a multilevel design that incorporates macro-level and micro-level perspectives, our study provides a more holistic explanation of the consequences of climate impact on individual engagement in entrepreneurship. This design allows us to uncover nuanced effects that are often obscured in aggregated macro-level analyses (e.g., Boudreaux et al., 2019a, 2022).

Furthermore, building on a recent development to leverage the ABV in entrepreneurship research (e.g., Wei et al., 2024; Yoon et al., 2024), our study shows and indicates that experiencing climate impact affects individuals' situated attention allocation, which then affects engagement in opportunity entrepreneurship. The recency and small scope of prior research in this area is surprising because attention is for long used as an important construct in entrepreneurship research, for example when investigating the alertness towards entrepreneurship (e.g., Baron, 2004; Valliere, 2013b). In addition to introducing an attention-based perspective to explain the effects of climate impact, we blend the ABV's theoretical arguments with SCT. This combination allows us to theorize how individual cognitive differences, which are well-documented determinants of engagement in entrepreneurship, interact with the allocation of attention, ultimately affecting opportunity entrepreneurship. While we integrate the ABV and SCT, other theoretical frameworks common in entrepreneurship could be used in a similar way and have already been used to theorize how entrepreneurs allocate their attention. For example, prior studies have combined the ABV with social network theory (e.g., Rhee & Leonardi, 2024), utility theory (e.g., Burmeister-Lamp et al., 2012), and resource allocation theory (e.g., Belkhouja et al., 2021). Therefore, we conclude that the ABV provides a promising theoretical anchor for future entrepreneurship research, especially for research that seeks to combine micro-level and macro-level perspectives.

Moreover, some of our findings regarding the moderating role of socio-cognitive characteristics are counterintuitive. First, we show that entrepreneurial self-efficacy weakens the positive relationship between climate impact and opportunity entrepreneurship. While this seems counterintuitive as it contradicts prior results from humanitarian crises (e.g., Bullough et al., 2014) and results regarding technological uncertainties in the environment (e.g., Schmitt et al., 2018), the result is in line with more recent research suggesting that self-efficacy is different predictor of entrepreneurial intentions in disruptive, instable environments (e.g., Bergenholtz et al., 2023; Renko et al., 2021). Reinforcing these findings, our results suggest that the role of entrepreneurial self-efficacy seems to depend on the type of uncertainty that attracts the entrepreneur's attention. One possible explanation is that more existential societal disruptions such as the COVID-19 pandemic (Bergenholtz et al., 2023) or, in our case, climate impact, have a greater scope and lower predictability (see Davidsson et al., 2020 for a classification of different environmental changes), which tends to fundamentally lower the perceived control over the environment, so that entrepreneurs with high entrepreneurial self-efficacy focus their attention on other areas and less on opportunity entrepreneurship.

Second, we find that entrepreneurial alertness negatively moderates the relationship between climate impact and opportunity entrepreneurship, adding to research about how entrepreneurial alertness shapes entrepreneurial intentions (e.g., Tang et al., 2012; Valliere, 2013b). Prior research widely shows that entrepreneurial alertness interacts positively with several environmental factors (e.g., level of digital infrastructure, economic freedom) regarding engagement in entrepreneurship (e.g., Boudreaux et al., 2019b; Schade & Schuhmacher, 2022). Contrasting these findings, we show that the role of entrepreneurial alertness seems to be different in the context of climate impact, where the interaction between entrepreneurial alertness and climate impact is negative. Again, this could be explained by other levels of attention on a specific kind of uncertainty that is prevalent in the aftermath of climate disruptions. In turn, this can create competing signals for individuals with entrepreneurial alertness and thus reduce their likelihood to engage in entrepreneurship.

Finally, the positive moderation by entrepreneurial fear of failure is in line with Wei et al. (2024), who show that entrepreneurial fear of failure increases engagement in social entrepreneurship after natural disasters. While this effect is again somehow counterintuitive, the similar finding of Wei et al. (2024), investigating with natural disasters and social entrepreneurship activity a very related topic to ours, strengthens our assumption that a high attention on climate impact goes along with special situational characteristics that explain the different role of this socio-cognitive characteristic.

Finally, while our study assesses the moderating role of socio-cognitive characteristics, our further analyses suggest that other personal attributes can also shape the effect of climate impact on opportunity entrepreneurship. This ties in with recent research exploring the roles of personal attributes in disruptive environmental situations (e.g., Motley et al., 2023). Specifically, our results indicate that being a woman strengthens the relationship between climate impact and opportunity entrepreneurship, which is in line with research suggesting that women are more prone to pro-environmental behavior (e.g., Grimes et al., 2018; Pearse, 2017; Rosca et al., 2020). However, our results contrast those of Wei et al. (2024), who show that men participate more in social entrepreneurship after natural disasters, potentially a result of different dependent variables used—in their case social vs. opportunity entrepreneurship in ours. While both constructs overlap, they are not identical. Finally, we show that the findings of Wei et al. (2024) regarding a negative moderation of education on the relationship between climate impact and social entrepreneurship also apply for opportunity entrepreneurship. Overall, these results demonstrate that it is important to consider further personal characteristics in addition to socio-cognitive characteristics when examining how individuals allocate attention to climate impact.

6.2 Implications for practice

Our findings provide decision support to policymakers by offering an evidence-based foundation for designing policy interventions intended to foster opportunity entrepreneurship in response to climate impact. Utilizing our insights on how climate impact increases opportunity entrepreneurship, policymakers can design more effective entrepreneurial support programs when a country experiences strong climate events, which coincide with high attention levels. Fostering opportunity entrepreneurship helps create both long-term economic growth and a more sustainable environment characterized by a mitigation of the current situation and better preparation for future climate impacts. Governments could foster and create programs to support innovations and entrepreneurship that directly address climate-impact scenarios or develop programs supporting climate adaptation and mitigation entrepreneurial activities overall (e.g., allocation of governmental impact investments). Examples include the "D-Tech Award" or the different awards and support mechanisms provided by the United Nations Office for Disaster Risk Reduction (UNDRR).[6]

Second, the results regarding our moderation analyses have some nuanced policy implications that are directed to certain groups of individuals. Because we find that high entrepreneurial self-efficacy, entrepreneurial alertness, and human capital negatively relate to the relationship between climate impact and opportunity entrepreneurship, governmental programs should investigate root causes and identify programs to support individuals who score high in these characteristics. This is particularly important for policymakers in countries that are more heavily affected by climate impact. Having individuals high in entrepreneurial self-efficacy and education increasingly engage in opportunity entrepreneurship could lead to further important societal contributions because those individuals are, for example, more likely to be successful (e.g., Hopp & Stephan, 2012) or to create sustainable solutions (e.g., Hockerts, 2017). In addition, policy initiatives could be tailored towards women and individuals high in entrepreneurial fear of failure because these groups are already more likely to engage in opportunity entrepreneurship in the face of climate impact. Such specifically targeted, sustainable incubator programs for individuals with intentions to engage in opportunity entrepreneurship (e.g., Hirschmann et al., 2022) could serve as an important tool to address the needs of specific groups of individuals in times of increasing climate impact.

Overall, our findings supplement policy implications formulated in prior research about the role of individual characteristics in response to other environmental changes by providing a new perspective on climate events (e.g., Bergenholtz et al., 2023; Schade & Schuhmacher, 2022). As these events are increasing year by year, it is important for policymakers and practitioners that future research continues exploring the related particularities. This is especially critical because we show that the interactions between climate impact and individual characteristics are sometimes counterintuitive, reinforcing the need to better understand the role of attention on these new levels of environmental uncertainty due to these disruptions from a policy perspective.

6.3 Limitations and avenues for future research

Our study has several limitations that open avenues for future research. The first set of limitations refers to our data. For example, using panel data instead of longitudinal data would help establish a stronger causal relationship among our variables of interest. However, such panel data is not available in the GEM and we are not aware of any other suitable panel datasets that cover entrepreneurship data. Thus, even though we use lagged values of our independent variables, we cannot entirely rule out endogeneity concerns.

Additionally, we conceptually argue that climate impact spurs individual engagement in opportunity entrepreneurship. However, we are not able to differentiate the precise type of opportunity entrepreneurship. That is, we cannot differentiate between climate-related and climate-unrelated opportunity entrepreneurship. Climate impact-related opportunity entrepreneurship could refer to climate impact *as a catalyst* for opportunity entrepreneurship as well as to ventures that combat climate impact in any sense whereas climate impact-unrelated opportunity entrepreneurship captures all endeavors with no connection at all to climate

[6] For more information see https://www.safestepsdtech.com/ (last accessed: April 18, 2025) and https://www.undrr.org/our-impact/news/awards (last accessed: April 18, 2025).

impact. While there is an overlap between ventures that are sparked by climate impact and those that seek to mitigate the effects of climate impact, the two climate impact-related groups are not identical. This is in line with prior research that suggests the disruption brought by climate impact can lead to opportunities that do not necessarily serve the environment and can even be exploitative (e.g., Williams & Shepherd, 2016b). Unfortunately, our measure of opportunity entrepreneurship does not capture the motivation to engage in opportunity entrepreneurship in a more nuanced way, so we cannot determine whether the individuals in our sample seek to pursue opportunities that are related to climate issues. This is complicated by the fact that such motivations are often implicit, so that it is generally difficult to determine the extent to which factors such as climate impact affect individual decision-making via surveys or secondary data. This opens an important avenue for future research, which we encourage to investigate other types of productive entrepreneurship (e.g., high-impact entrepreneurship, sustainable entrepreneurship). In this respect, the GEM has begun to annually collect data related to sustainable entrepreneurship in 2021. This means that future research will be able to revisit our findings and assess whether the opportunities pursued are more often climate-related.

Next, we capture climate impact at the country level. However, climate events likely do not affect all individuals in a country equally, especially in larger countries. While we address differences related to geographic size in a robustness check, future research could explore such spatial differences more thoroughly by gathering regional data. Specifically, we encourage future research to distinguish between entrepreneurs who personally and directly experience climate impact and those who only indirectly gain awareness of climate impact. Prior research shows that varying degrees of direct exposure (for example, greater physical damage and monetary loss) can significantly influence entrepreneurial cognitions, motivations, and subsequent strategies (e.g., Shepherd & Williams, 2014). Delving deeper could shed light on how different levels of exposure might relate not only to opportunity entrepreneurship but also to other forms such as necessity or social entrepreneurship.

Finally, our theoretical argumentation revolves around climate impact and the individual allocation of attention. While our argumentation mirrors recent theoretical advances in entrepreneurship research and is firmly grounded in the ABV (e.g., Wei et al., 2024; Yoon et al., 2024), we do not directly observe attention levels and attentional differences between individuals. Thus, our arguments and interpretations are preliminary, and we encourage future research to reaffirm or deepen our theoretical considerations. One avenue is to capture entrepreneurs' attention allocation towards climate impact more directly, for example, in experimental settings (e.g., Carlson et al., 2022). Another avenue would be to investigate different attention effects of climate impacts in different countries, making use of country differences in climate change awareness and media attention (e.g., Baiardi, 2023).

Appendix

Table 6 Detailed sample breakdown by country and year. For each country, the first line indicates the number of respondents, followed by the number of opportunity entrepreneurs (dependent variable) in italics, and climate impact (CRI) (independent variable) in brackets

#	Country	Year 2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
1	Algeria	- - (-0.92)	1,526 *65* (-0.45)	1,854 *15* (-0.47)	1,204 *23* (-0.76)	- - (-0.92)	- - (-0.78)	- - (-1.04)	- - (-1.13)	- - (-0.94)	4,584 *103* (-0.82)
2	Angola	564 *81* (-0.42)	- - (-0.43)	710 *122* (-0.80)	573 *52* (-0.84)	518 *57* (-1.00)	- - (-0.56)	- - (-0.46)	- - (-0.83)	823 *176* (-0.76)	3,170 *823* (-0.68)
3	Argentina	1,166 *46* (-0.70)	1,240 *116* (-0.43)	1,085 *94* (-0.47)	924 *76* (-0.20)	1,059 *71* (-0.66)	1,478 *131* (-0.64)	889 *63* (-0.45)	912 *37* (-0.56)	702 *45* (-0.48)	9,455 *679* (-0.51)
4	Australia	1,238 *33* (-0.32)	1,412 *72* (-0.24)	- - (-0.66)	- - (-0.36)	1,318 *85* (-0.51)	1,348 *90* (-0.36)	1,179 *87* (-0.42)	1,199 *68* (-0.30)	- - (-0.50)	7,694 *435* (-0.41)
5	Austria	- - (-0.85)	- - (-0.78)	1,849 *111* (-0.87)	- - (-0.36)	2,000 *103* (-0.87)	- - (-0.57)	2,072 *110* (-0.59)	- - (-0.53)	1,834 *118* (-0.56)	7,755 *442* (-0.66)
6	Bangladesh	- - (-0.61)	1,847 *94* (-0.51)	- - (-0.25)	- - (-0.47)	- - (-0.46)	- - (-0.46)	- - (-0.27)	- - (-0.16)	- - (-0.86)	1,847 *94* (-0.45)
7	Barbados	- - (-0.72)	456 *29* (-0.94)	558 *55* (-1.26)	854 *84* (-1.09)	661 *57* (-1.18)	902 *115* (-1.25)	- - (-1.10)	- - (-1.16)	- - (-1.25)	3,431 *340* (-1.10)
8	Belgium	- - (-0.66)	831 *26* (-0.52)	929 *18* (-0.72)	1,132 *21* (-0.82)	1,227 *29* (-0.64)	1,220 *51* (-0.53)	- - (-0.68)	- - (-0.77)	- - (-0.82)	5,339 *145* (-0.68)
9	Belize	- - (-0.68)	- - (-0.87)	- - (-0.891	- - (-0.98)	1,717 *61* (-1.18)	- - (-1.25)	1,460 *282* (-0.58)	- - (-1.16)	- - (-1.25)	3,177 *343* (-0.98)
10	Bolivia	2,255 *631* (-0.28)	- - (-0.31)	- - (-0.97)	- - (-0.30)	1,841 *317* (-0.16)	- - (-0.47)	- - (-0.19)	- - (-0.48)	- - (-0.64)	4,096 *948* (-0.42)

Table 6 (continued)

#	Country	Year 2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
11	Bosnia & Herzigoniva	1,294	1,587	1,325	1,566	1,456	-	-	628	-	7,856
		21	*20*	*27*	*44*	*29*	-	-	*9*	-	*150*
		(-0.75)	(-0.50)	(-0.22)	(1.08)	(-0.12)	(-0.58)	(-1.10)	(-0.61)	(-1.10)	(-0.67)
12	Botswana	-	-	766	1,402	1,154	1,353	-	-	-	4,675
		-	-	*134*	*149*	*267*	*272*	-	-	-	*822*
		(-1.06)	(-0.94)	(-0.79)	(-0.86)	(-1.18)	(-0.70)	(-1.10)	(-0.72)	(-1.25)	(-0.96)
13	Brazil	1,495	1,639	7,434	7,835	7,450	1,502	1,568	1,533	1,367	31,823
		70	*58*	*303*	*352*	*252*	*77*	*86*	*54*	*21*	*1,273*
		(-0.33)	(-0.14)	(-1.13)	(-0.43)	(-0.31)	(-0.76)	(-0.55)	(-0.75)	(-0.83)	(-0.58)
14	Bulgaria	-	-	-	-	-	918	1,073	993	572	3,556
		-	-	-	-	-	*10*	*24*	*17*	*10*	*61*
		(-0.99)	(-0.59)	(-0.39)	(-1.02)	(-0.14)	(-0.43)	(-1.10)	(-0.58)	(-1.01)	(-0.69)
15	Burkina Faso	-	-	-	-	1,582	1,252	1,128	-	-	3,962
		-	-	-	-	*317*	*275*	*250*	-	-	*842*
		(-0.70)	(-0.56)	(-0.90)	(-0.89)	(-1.18)	(-0.61)	(-0.68)	(-0.16)	(-0.25)	(-0.89)
16	Cameroon	-	-	-	-	930	1,462	1,284	-	-	3,640
		-	-	-	-	*237*	*211*	*222*	-	-	*670*
		(-0.81)	(-0.60)	(-0.67)	(-0.10)	(-1.06)	(-1.02)	(-0.98)	(-0.97)	(-1.06)	(-0.91)
17	Canada	-	-	-	1,841	1,463	2,142	1,064	1,145	1,085	8,740
		-	-	-	*136*	*110*	*147*	*95*	*118*	*105*	*705*
		(-0.39)	(-0.56)	(-0.33)	(-0.33)	(-0.68)	(-0.71)	(-0.52)	(-0.53)	(-0.22)	(-0.51)
18	Chile	5,402	5,364	1,651	4,812	4,266	4,652	6,888	6,764	6,780	46,579
		404	*609*	*183*	*587*	*588*	*551*	*840*	*791*	*866*	*5,419*
		(-1.06)	(-0.39)	(-0.98)	(-0.52)	(-0.63)	(-0.25)	(-0.62)	(-0.27)	(-0.81)	(-0.61)
19	China	2,043	2,126	2,458	2,315	2,266	2,621	2,901	2,975	2,702	22,407
		79	*146*	*86*	*84*	*119*	*112*	*86*	*76*	*91*	*879*
		(-0.24)	(-0.32)	(-0.37)	(-0.25)	(-0.29)	(-0.38)	(-0.24)	(-0.42)	(-0.45)	(-0.33)
20	Colombia	7,132	7,661	1,651	4,812	4,266	4,652	6,888	6,764	6,780	32,609
		488	*1,042*	*674*	*353*	*314*	*391*	*252*	*161*	*219*	*3,894*
		(-0.08)	(-0.34)	(-0.36)	(-0.58)	(-0.43)	(-0.46)	(-0.69)	(-0.31)	(-0.61)	(-0.43)
21	Costa Rica	1,119	-	1,433	-	1,681	-	-	-	-	4,233
		124	-	*127*	-	*108*	-	-	-	-	*359*
		(-0.30)	(-0.40)	(-0.98)	(-1.09)	(-0.83)	(-0.78)	(-0.40)	(-0.34)	(-0.85)	(-0.66)
22	Croatia	-	1,337	1,297	1,378	1,363	1,315	1,254	1,267	1,188	10,399
		-	*38*	*60*	*64*	*45*	*46*	*49*	*61*	*55*	*418*
		(-0.75)	(-0.92)	(-0.35)	(-0.98)	(-0.38)	(-0.83)	(-1.10)	(-0.58)	(-1.08)	(-0.77)

Table 6 (continued)

#	Country	Year 2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
23	Cyprus	- - (-1.06)	- - (-0.94)	- - (-1.26)	- - (-1.02)	- - (-1.18)	- - (-1.25)	1,264 *75* (-0.38)	1,259 *36* (-0.84)	1,439 *15* (-0.74)	3,962 *126* (-0.96)
24	Czech Republic	- - (-0.52)	1,276 *52* (-0.94)	- - (-0.67)	3,421 *163* (-0.30)	- - (-1.12)	- - (-0.99)	- - (-0.79)	- - (-0.52)	- - (-0.47)	4,697 *215* (-0.70)
25	Denmark	- - (-1.06)	1,286 *42* (-0.54)	1,402 *53* (-1.05)	- - (-0.39)	1,070 *37* (-0.82)	- - (-1.04)	- - (-0.90)	- - (-1.16)	- - (-0.61)	3,758 *132* (-0.84)
26	Ecuador	1,434 *157* (-0.88)	- - (-0.75)	1,528 *208* (-0.51)	1,553 *292* (-0.53)	1,571 *316* (-0.56)	1,738 *369* (-0.69)	1,654 *272* (-0.46)	1,582 *244* (-0.30)	- (-0.97)	11,060 *1,858* (-0.63)
27	Egypt	- - (-0.62)	- - (-0.94)	1,370 *31* (-1.26)	- - (-1.26)	- - (-1.09)	1,947 *62* (-0.60)	1,097 *77* (-0.73)	1,355 *68* (-1.16)	1,228 *32* (-1.14)	6,997 *270* (-0.97)
28	El Salvador	- - (-0.42)	- - (-0.11)	972 *72* (-1.22)	- - (-1.04)	907 *111* (-0.63)	- - (-0.53)	1,184 *58* (-0.94)	- - (-0.83)	- - (-0.44)	3,063 *241* (-0.69)
29	Estonia	- - (-1.06)	- - (-0.82)	1,124 *92* (-1.06)	1,131 *78* (-0.87)	1,028 *71* (-1.18)	1,228 *101* (-1.25)	1,281 *122* (-1.10)	989 *122* (-1.16)	- - (-0.91)	6,782 *586* (-1.04)
30	Ethiopia	- - (-0.87)	- - (-0.92)	2,545 *129* (-1.18)	- - (-0.85)	- - (-1.05)	- - (-0.64)	- - (-0.42)	- - (-0.54)	- - (-0.63)	2,545 *129* (-0.79)
31	Finland	- - (-0.80)	1,129 *33* (-0.58)	1,146 *38* (-1.26)	1,204 *27* (-0.77)	1,224 *37* (-1.18)	1,218 *53* (-1.24)	1,298 *53* (-1.10)	- - (-1.16)	- - (-1.25)	7,219 *241* (-1.04)
32	France	1,566 *37* (-0.35)	1,547 *49* (-0.54)	2,589 *64* (-0.80)	1,084 *28* (-0.57)	1,363 *38* (-0.41)	- - (-0.33)	1,424 *37* (-0.56)	1,420 *32* (-0.61)	1,318 *31* (-0.46)	12,311 *316* (-0.51)
33	Georgia	- - (-1.03)	- - (-0.45)	- - (-0.43)	- - (-0.64)	1,203 *35* (-0.70)	- - (-0.44)	1,278 *37* (-1.10)	- - (-0.85)	- - (-0.98)	2,481 *72* (-0.73)
34	Germany	2,985 *71* (-0.53)	2,610 *94* (-0.47)	2,102 *57* (-0.68)	3,847 *132* (-0.39)	2,858 *100* (-0.61)	2,455 *79* (-0.64)	2,557 *98* (-0.52)	2,902 *107* (-0.50)	2,866 *75* (-0.14)	25,182 *813* (-0.50)

Table 6 (continued)

#	Country	Year									
		2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
35	Ghana	1,125	-	1,100	1,379	-	-	-	-	-	3,604
		144	-	*203*	*103*	-	-	-	-	-	*450*
		(-0.41)	(-0.44)	(-1.26)	(-0.93)	(-1.02)	(-0.23)	(-0.86)	(-0.82)	(-0.68)	(-0.74)
36	Greece	1,399	1,470	1,271	1,511	1,552	1,430	1,635	1,656	1,584	13,508
		20	*46*	*28*	*25*	*50*	*45*	*31*	*34*	*56*	*335*
		(-0.98)	(-0.90)	(-0.81)	(-0.76)	(-0.79)	(-0.65)	(-0.63)	(-0.40)	(-0.24)	(-0.68)
37	Guatemala	1,441	1,560	-	1,469	1,344	1,557	1,718	1,810	2,065	12,964
		20	*159*	-	*88*	*130*	*129*	*169*	*217*	*235*	*1,147*
		(-0.06)	(-0.16)	(-0.73)	(-0.51)	(-0.47)	(-0.45)	(-0.69)	(-0.70)	(-0.77)	(-0.50)
38	Hungary	1,412	1,372	1,435	1,390	1,349	1,172	1,208	-	-	9,338
		64	*46*	*50*	*50*	*59*	*50*	*49*	-	-	*368*
		(-0.65)	(-0.70)	(-0.48)	(-0.73)	(-0.75)	(-0.97)	(-1.10)	(-0.99)	(-1.07)	(-0.83)
39	India	-	-	2,449	2,302	2,705	2,788	2,448	3,081	2,910	18,683
		-	-	*105*	*68*	*72*	*167*	*42*	*67*	*198*	*719*
		(-0.40)	(-0.27)	(-0.52)	(-0.13)	(-0.16)	(-0.15)	(-0.18)	(-0.23)	(-0.18)	(-0.25)
40	Indonesia	-	-	-	3,518	3,830	3,792	2,389	1,885	2,187	17,601
		-	-	-	*162*	*156*	*248*	*104*	*43*	*125*	*838*
		(-0.49)	(-0.58)	(-0.72)	(-0.33)	(-0.29)	(-0.49)	(-0.46)	(-0.56)	(-0.68)	(-0.51)
41	Iran	1,507	1,379	2,483	2,463	2,846	2,242	2,489	2,111	2,028	19,548
		51	*58*	*93*	*149*	*154*	*162*	*119*	*121*	*64*	*971*
		(-0.97)	(-0.71)	(-1.17)	(-1.05)	(-0.58)	(-0.52)	(-0.77)	(-0.48)	(-0.65)	(-0.77)
42	Ireland	1,519	1,390	1,446	1,088	1,421	1,338	1,290	1,135	1,262	11,889
		48	*47*	*39*	*51*	*50*	*84*	*84*	*62*	*80*	*545*
		(-1.06)	(-0.49)	(-0.96)	(-0.69)	(-0.54)	(-0.70)	(-1.02)	(-0.64)	(-0.77)	(-0.77)
43	Israel	-	-	1,186	1,162	-	845	1,172	914	934	6,213
		-	-	*35*	*62*	-	*65*	*68*	*65*	*43*	*338*
		(-0.25)	(-0.94)	(-1.02)	(-0.38)	(-1.08)	(-0.93)	(-0.62)	(-1.16)	(-0.90)	(-0.81)
44	Italy	1,187	-	1,009	1,083	1,395	1,299	1,197	1,232	1,247	9,649
		14	-	*19*	*23*	*41*	*41*	*33*	*31*	*25*	*227*
		(-0.87)	(-0.44)	(-0.45)	(-0.49)	(-0.43)	(-0.34)	(-0.77)	(-0.45)	(-0.34)	(-0.51)
45	Jamaica	943	683	843	471	1,816	-	1,240	-	-	5,996
		41	*55*	*294*	*24*	*102*	-	*20*	-	-	*536*
		(-0.33)	(-0.73)	(-0.58)	(-1.09)	(-0.81)	(-1.25)	(-0.83)	(-0.81)	(-1.10)	(-0.84)
46	Japan	969	1,523	1,223	1,083	1,096	-	-	1,076	1,123	8,093
		15	*45*	*25*	*24*	*23*	-	-	*35*	*37*	*204*
		(-0.78)	(-0.38)	(-0.55)	(-0.44)	(-0.25)	(-0.46)	(-0.58)	(-0.47)	(-0.06)	(-0.44)

Table 6 (continued)

#	Country	Year 2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
47	Jordan	-	-	-	-	-	-	1,747	-	-	1,747
		-	-	-	-	-	-	*47*	-	-	*47*
		(-1.06)	(-0.94)	(-1.26)	(-0.30)	(-0.99)	(-1.04)	(-1.10)	(-1.16)	(-0.56)	(-0.93)
48	Kazakhstan	-	-	-	-	1,051	871	769	604	-	3,295
		-	-	-	-	*81*	*66*	*60*	*54*	-	*261*
		(-0.59)	(-0.84)	(-1.10)	(-1.09)	(-1.16)	(-0.93)	(-0.98)	(-0.67)	(-0.99)	(-0.93)
49	Korea	1,341	1,289	1,226	1,476	-	1,267	1,275	1,530	1,543	10,947
		22	*23*	*22*	*32*	(-0.54)	*62*	*46*	*82*	*95*	*384*
		(-0.83)	(-0.37)	(-0.52)	(-0.93)		(-1.25)	(-0.61)	(-0.79)	(-0.77)	(-0.73)
50	Latvia	-	1,259	1,169	1,120	-	1,164	1,217	1,169	-	7,098
		-	*70*	*73*	*85*	-	*88*	*82*	*79*	-	*477*
		(-1.06)	(-0.94)	(-0.84)	(-0.86)	(-1.17)	(-1.25)	(-1.10)	(-0.35)	(-0.50)	(-0.89)
51	Lebanon	-	-	-	-	-	1,383	1,543	1,140	1,034	5,100
		-	-	-	-	-	*159*	*121*	*103*	*86*	*469*
		(-0.85)	(-0.87)	(-0.81)	(-0.69)	(-1.03)	(-0.72)	(-1.10)	(-1.16)	(-0.67)	(-0.88)
52	Lithuania	-	1,306	969	1,257	1,258	-	-	-	-	4,790
		-	*65*	*24*	*63*	*80*	-	-	-	-	*232*
		(-0.83)	(-0.90)	(-0.83)	(-0.98)	(-1.18)	(-1.25)	(-1.10)	(-1.16)	(-0.29)	(-0.94)
53	Luxembourg	-	-	-	757	904	739	779	794	-	3,973
		-	-	-	*51*	*49*	*61*	*45*	*51*	-	*257*
		(-0.81)	(-0.94)	(-1.26)	(-1.09)	(-0.93)	(-1.25)	(-0.77)	(-1.16)	(-0.84)	(-1.01)
54	Madagascar	-	-	-	-	-	-	-	1,298	1,482	2,780
		-	-	-	-	-	-	-	*134*	*232*	*255*
		(-0.36)	(-0.36)	(-0.16)	(-0.32)	(-0.44)	(-0.23)	(-0.60)	(-0.15)	(-0.16)	(-0.31)
55	Malawi	-	-	1,234	1,485	-	-	-	-	-	2,719
		-	-	*185*	*106*	-	-	-	-	-	*291*
		(-0.87)	(-0.69)	(-0.78)	(-0.59)	(-0.62)	(-0.14)	(-0.65)	(-0.61)	(-0.84)	(-0.64)
56	Malaysia	1,382	1,773	1,826	1,737	1,593	1,917	1,771	1,658	-	13,657
		27	*41*	*41*	*23*	*21*	*12*	*28*	*222*	-	*415*
		(-0.97)	(-0.60)	(-1.02)	(-0.84)	(-0.41)	(-1.17)	(-0.66)	(-0.53)	(-0.85)	(-0.78)
57	Mexico	1,569	1,169	1,400	1,794	1,456	2,661	3,046	3,691	-	16,786
		119	61	*123*	*118*	*165*	*464*	*137*	*329*	-	*1,516*
		(-0.28)	(-0.26)	(-0.65)	(-0.15)	(-0.40)	(-0.56)	(-0.47)	(-0.65)	(-0.38)	(-0.42)
58	Morocco	-	-	-	-	-	1,371	1,330	1,904	1,295	5,900
		-	-	-	-	-	*16*	*16*	*72*	*32*	*136*
		(-0.54)	(-0.92)	(-1.18)	(-1.04)	(-0.25)	(-1.22)	(-0.93)	(-1.16)	(-1.25)	(-0.94)

Table 6 (continued)

#	Country	Year 2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
59	Namibia	-	-	865	1,206	-	-	-	-	-	2,071
		-	-	*69*	*218*	-	-	-	-	-	*287*
		(-0.63)	(-0.28)	(-0.96)	(-0.55)	(-1.04)	(-0.86)	(-0.41)	(-1.16)	(-0.79)	(-0.74)
60	Netherlands	2,067	2,069	2,179	1,992	1,537	1,505	1,398	1,539	1,412	15,698
		55	*94*	*96*	*93*	*70*	*79*	*74*	*80*	*77*	*718*
		(-0.90)	(-0.89)	(-1.06)	(-0.66)	(-0.95)	(-0.95)	(-0.61)	(-0.90)	(-0.67)	(-0.84)
61	Nigeria	-	1,289	1,387	1,786	-	-	-	-	-	4,462
		-	*268*	*266*	*344*	-	-	-	-	-	*878*
		(-0.59)	(-0.38)	(-0.22)	(-0.80)	(-0.84)	(-0.76)	(-0.64)	(-0.75)	(-0.29)	(-0.59)
62	Norway	1,402	1,334	1,406	1,105	1,280	1,383	-	-	-	7,910
		45	*54*	*52*	*34*	*36*	*41*	-	-	-	*262*
		(-1.06)	(-0.40)	(-1.26)	(-0.73)	(-0.86)	(-0.71)	(-0.77)	(-0.85)	(-0.84)	(-0.83)
63	Pakistan	1,210	1,259	1,503	-	-	-	-	-	-	3,972
		60	*54*	*72*	-	-	-	-	-	-	*186*
		(-0.04)	(-0.11)	(-0.13)	(-0.16)	(-0.13)	(-0.28)	(-0.51)	(-0.43)	(-0.88)	(-0.29)
64	Panama	-	1,628	1,490	1,628	1,788	1,613	1,787	1,711	1,803	13,448
		-	*177*	*89*	*226*	*194*	*47*	*141*	*154*	*122*	*1,150*
		(0.68)	(-0.81)	(-0.66)	(-0.83)	(-0.67)	(-1.05)	(-0.65)	(-0.74)	(-0.83)	(-0.77)
65	Peru	1,325	1,072	1,161	1,198	1,342	1,470	1,246	1,206	1,191	11,211
		304	*160*	*178*	*217*	*298*	*246*	*209*	*204*	*191*	*2,007*
		(-0.24)	(-0.56)	(-0.27)	(-0.49)	(-0.68)	(-0.46)	(-0.48)	(-0.11)	(-0.94)	(-0.47)
66	Philippines	-	-	-	1,886	1,548	1,519	-	-	-	4,953
		-	-	-	*155*	*115*	*119*	-	-	-	*389*
		(-0.27)	(-0.12)	(-0.10)	(-0.02)	(-0.13)	(-0.29)	(-0.31)	(-0.33)	(-0.11)	(-0.19)
67	Poland	-	1,276	1,383	1,280	1,182	1,059	1,121	2,043	4,278	13,622
		-	*55*	*35*	*35*	*60*	*40*	*39*	*95*	*164*	*523*
		(-0.18)	(-0.79)	(-0.62)	(-0.95)	(-0.60)	(-0.67)	(-0.64)	(-0.38)	(-0.49)	(-0.59)
68	Portugal	823	1,021	1,155	1,075	1,179	1,036	988	-	-	7,277
		13	*47*	*48*	*42*	*57*	*45*	*46*	-	-	*298*
		(-0.20)	(-0.90)	(-0.63)	(-0.35)	(-0.54)	(-1.05)	(-0.56)	(-0.17)	(-0.71)	(-0.57)
69	Qatar	-	-	-	-	3,193	-	1,245	1,521	1,615	7,574
		-	-	-	-	*370*	-	*44*	*65*	*68*	*547*
		(-1.06)	(-0.94)	(-1.26)	(-1.09)	(-1.18)	(-1.10)	(-1.10)	(-1.16)	(-1.25)	(-1.13)
70	Romania	1,207	1,275	1,190	1,381	1,179	1,427	-	-	-	7,659
		14	*48*	*50*	*68*	*42*	*77*	-	-	-	*299*
		(-0.34)	(-0.73)	(-0.30)	(-0.75)	(-0.52)	(-0.62)	(-0.92)	(-0.64)	(-0.82)	(-0.63)

Table 6 (continued)

#	Country	Year 2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
71	Russia	489 *6* (-0.11)	2,747 *46* (-0.78)	1,819 *35* (-0.22)	1,018 *23* (-0.61)	1,050 *17* (-0.80)	- - (-0.60)	1,486 *33* (-0.61)	- - (-0.69)	1,137 *18* (-0.76)	9,746 *178* (-0.57)
72	Saudi Arabia	- - (-0.59)	- - (-0.50)	- - (-0.97)	- - (-0.42)	- - (-0.92)	- - (-0.73)	3,236 *129* (-0.70)	3,054 *102* (-0.81)	2,312 *137* (-0.89)	8,602 *368* (-0.72)
73	Senegal	- - (-1.06)	- - (-0.94)	- - (-0.47)	- - (-0.63)	- - (-0.76)	1,231 *345* (-1.06)	- - (-0.60)	- - (-1.11)	- - (-1.05)	1,231 *345* (-0.85)
74	Singapore	- - (-0.88)	- - (-0.88)	1,335 *102* (-1.26)	1,326 *86* (-1.08)	1,244 *75* (-1.16)	- - (-1.25)	- - (-1.10)	- - (-1.16)	- - (-1.25)	3,908 *263* (-1.11)
75	Slovak Republic	- - (-0.65)	1,411 *107* (-0.86)	1,298 *67* (-0.43)	1,292 *43* (-1.08)	1,170 *66* (-0.70)	1,253 *64* (-1.05)	837 *42* (-1.10)	851 *60* (-0.65)	849 *68* (-0.88)	8,961 *517* (-0.82)
76	Slovenia	- - (-0.58)	1,035 *19* (-0.88)	1,013 *23* (-0.66)	1,275 *30* (-1.07)	976 *28* (-0.36)	1,090 *34* (-1.25)	1,189 *49* (-1.10)	1,143 *38* (-0.82)	1,217 *32* (-0.58)	8,938 *253* (-0.81)
77	South Africa	- - (-0.58)	- - (-0.65)	2,581 *74* (-0.40)	2,937 *130* (-0.3733)	3,302 *78* (-0.46)	2,762 *96* (-0.46)	2,620 *68* (-0.42)	2,169 *121* (-0.36)	- - (-0.53)	16,371 *567* (-0.47)
78	Spain	14,043 *205* (-0.61)	8,780 *247* (-0.64)	11,544 *294* (-0.46)	11,863 *282* (-0.61)	13,769 *293* (-0.71)	12,547 *174* (-0.66)	10,114 *183* (-0.52)	11,169 *258* (-0.54)	10,926 *267* (-0.48)	104,755 *2,203* (-0.58)
79	Sudan	- - (-0.68)	- - (-0.87)	- - (-0.54)	- - (-0.40)	- - (-0.46)	- - (-0.75)	- - (-0.39)	- - (-0.63)	1,259 *112* (-0.49)	1,259 *112* (-0.58)
80	Suriname	- - (-1.06)	- - (-0.94)	- - (-1.26)	949 *32* (-1.09)	1,337 *17* (-1.18)	- - (-1.25)	- - (-1.10)	- - (-1.16)	- - (-1.25)	2,286 *49* (-1.14)
81	Sweden	- - (-1.06)	1,658 *53* (-0.75)	1,224 *43* (-1.07)	1,105 *55* (-0.58)	1,140 *60* (-0.75)	1,884 *97* (-0.90)	1,458 *99* (-0.94)	1,333 *85* (-1.08)	1,640 *80* (-0.89)	11,442 *572* (-0.89)
82	Switzerland	1,234 *16* (-0.93)	1,216 *42* (-0.36)	1,209 *28* (-0.73)	1,300 *47* (-0.57)	1,401 *29* (-0.65)	1,316 *48* (-0.85)	2,096 *65* (-0.79)	1,474 *55* (-0.59)	1,566 *34* (-0.74)	12,812 *364* (-0.69)
83	Thailand	- - (-0.25)	1,657 *123* (-0.025)	2,511 *210* (-0.70)	2,062 *143* (-0.23)	1,666 *132* (-0.64)	2,633 *116* (-0.57)	2,488 *125* (-0.38)	1,678 *181* (-0.16)	1,708 *123* (-0.69)	16,403 *1,153* (-0.41)

Table 6 (continued)

#	Country	Year 2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
84	Trinidad & Tobago	989	968	1,176	1,344	1,250	-	-	-	-	5,727
		86	*115*	*82*	*134*	*79*	-	-	-	-	*496*
		(-1.02)	(-0.68)	(-1.26)	(-1.02)	(-0.88)	(-1.25)	(-1.10)	(-0.85)	(-0.81)	(-0.98)
85	Tunisia	332	-	527	-	-	1,280	-	-	-	2,139
		7	-	*3*	-	-	*70*	-	-	-	*80*
		(-1.06)	(-0.76)	(-0.67)	(-1.04)	(-1.18)	(-1.25)	(-0.54)	(-0.82)	(-0.47)	(-0.87)
86	Turkey	1,312	1,387	1,213	21,905	-	-	1,293	-	1,365	28,475
		28	*62*	*68*	*1,040*	-	-	*138*	-	*107*	*1,443*
		(-0.77)	(-0.75)	(-0.89)	(-0.92)	(-0.92)	(-0.56)	(-0.93)	(-0.56)	(-0.79)	(-0.82)
87	Uganda	1,611	-	1,553	1,919	1,470	-	-	-	-	6,553
		151	-	*166*	*112*	*148*	-	-	-	-	*577*
		(-0.3783)	(-0.43)	(-0.82)	(-0.75)	(-0.91)	(-1.11)	(-0.51)	(-0.79)	(-0.25)	(-0.66)
88	United Arab Emirates	-	2,073	-	-	-	-	1,543	2,502	1,079	7,197
		-	*72*	-	-	-	-	*19*	*86*	*77*	*254*
		(-0.81)	(-0.94)	(-)	(-1.04)	(-0.97)	(-1.04)	(-0.72)	(-1.16)	(-1.25)	(-1.00)
89	United Kingdom	1,746	1,159	1,169	5,349	937	5,501	5,275	4,259	3,955	29,350
		37	*40*	*42*	*158*	*49*	*195*	*221*	*168*	*136*	*1,046*
		(-0.65)	(-0.69)	(-0.71)	(-0.23)	(-0.57)	(-0.65)	(-0.67)	(-0.87)	(-0.74)	(-0.64)
90	United States	2,054	3,524	3,254	3,327	1,805	1,091	2,181	1,456	1,716	20,408
		69	*241*	*217*	*227*	*163*	*86*	*172*	*122*	*163*	*1,460*
		(-0.38)	(-0.15)	(-0.24)	(-0.31)	(-0.30)	(-0.367)	(-0.23)	(-0.20)	(-0.24)	(-0.27)
91	Uruguay	1,390	1,538	1,209	1,148	1,155	1,405	1,407	1,417	1,406	12,075
		71	*58*	*96*	*86*	*107*	*102*	*91*	*116*	*104*	*834*
		(-0.815)	(-0.6583)	(-0.9117)	(-0.65)	(-0.57)	(-0.975)	(-0.3267)	(-1.16)	(-0.3567)	(-0.71)
92	Venezuela	-	1,032	-	-	-	-	-	-	-	1,032
		-	*110*	-	-	-	-	-	-	-	*110*
		(-0.43)	(-0.64)	(-1.17)	(-1.00)	(-0.66)	(-1.25)	(-0.96)	(-1.07)	(-1.04)	(-0.91)
93	Vietnam	-	-	-	1,574	1,678	1,657	-	-	-	4,909
		-	-	-	*67*	*33*	*16*	-	-	-	*116*
		(-0.29)	(-0.25)	(-0.39)	(-0.18)	(-0.63)	(-0.44)	(-0.15)	(-0.14)	(-0.26)	(-0.30)
94	Zambia	878	-	937	1,231	-	-	-	-	-	3,046
		169	-	*243*	*236*	-	-	-	-	-	*648*
		(-0.70)	(-0.84)	(-1.08)	(-1.00)	(-0.99)	(-0.98)	(-0.40)	(-1.16)	(-1.25)	(-0.93)
	Total	**79,581**	**93,455**	**114,736**	**146,727**	**123,089**	**108,077**	**112,661**	**97,709**	**88,405**	**964,440**
		4,163	***5,593***	***6,860***	***8,415***	***7,760***	***7,199***	***6,563***	***5,792***	***5,136***	***57,481***
		(-0.58)	**(-0.59)**	**(-0.55)**	**(-0.73)**	**(-0.63)**	**(-0.65)**	**(-0.72)**	**(-0.64)**	**(-0.63)**	**(-0.64)**

Not all countries participated in the Global Entrepreneurship Monitor in each year, so that no information on opportunity entrepreneurship is available (indicated by “-”)

Table 7 Further analysis: considering necessity entrepreneurship, country size, vulnerable industries, and social entrepreneurship

Model	(1)		(2)		(3)		(4)	
Dependent variable	Necessity entrepreneurship		Opportunity entrepreneurship		Opportunity entrepreneurship		Social opportunity entrepreneurship	
Statistic	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)
Individual-level control variables								
Age	0.074	(0.004)***	0.039	(0.002)***	0.034	(0.003)***	-0.003	(0.008)
Age squared	-0.001	(0.000)***	-0.001	(0.000)***	-0.001	(0.000)***	-0.000	(0.000)
Female	-0.120	(0.016)***	-0.350	(0.010)***	-0.226	(0.011)***	-0.112	(0.041)**
University degree	-0.197	(0.021)***	0.276	(0.011)***	0.330	(0.013)***	0.429	(0.045)***
Working status: working	-1.180	(0.018)***	-0.703	(0.010)***	-0.668	(0.012)***	0.045	(0.048)
Working status: retired/student	-0.648	(0.024)***	-1.025	(0.018)***	-0.948	(0.020)***	0.025	(0.069)
Low household income	0.284	(0.017)***	-0.217	(0.011)***	-0.210	(0.013)***	0.026	(0.047)
Entrepreneurial network	0.568	(0.016)***	0.736	(0.010)***	0.745	(0.012)***	0.577	(0.042)***
Entrepreneurial self-efficacy	1.153	(0.046)***	1.292	(0.013)***	1.281	(0.015)***	0.601	(0.109)***
Entrepreneurial alertness	0.226	(0.038)***	0.583	(0.010)***	0.613	(0.012)***	0.574	(0.102)***
Entrepreneurial fear of failure	-0.080	(0.038)*	-0.348	(0.011)***	-0.357	(0.012)***	0.068	(0.101)
Year dummies	Yes		Yes		Yes		Yes	
Country-level control variables								
GDP per capita (log)$_{t-1}$	0.041	(0.081)	0.166	(0.058)**	0.173	(0.062)**	-1.370	(1.089)
GDP growth per capita$_{t-1}$	-0.106	(0.371)	0.586	(0.228)*	0.075	(0.272)	-12.301	(17.283)
Population (log)$_{t-1}$	-0.018	(0.066)	-0.110	(0.228)*	-0.058	(0.055)	-0.307	(0.673)
Unemployment$_{t-1}$	2.108	(0.557)***	-0.882	(0.359)*	-0.243	(0.412)	9.508	(6.401)
Economic freedom$_{t-1}$	-0.081	(0.053)	-0.134	(0.037)***	-0.059	(0.042)	0.985	(0.611)
Patent applications (log)$_{t-1}$	-0.010	(0.009)	-0.012	(0.006)*	-0.021	(0.007)**	0.661	(0.325)*
Land area (log)	0.079	(0.053)	0.061	(0.045)	0.050	(0.044)	0.581	(0.293)*
Coastline length (log)	-0.052	(0.026)*	-0.024	(0.021)	-0.025	(0.021)	-0.161	(0.141)
Vulnerable industry	-	-	-	-	5.949	(0.115)***	-	-
Independent variable and interactions								
Climate impact (CRI)$_{t-1}$	0.096	(0.076)	-0.019	(0.166)	0.060	(0.030)*	-0.350	(1.473)
Climate impact (CRI)$_{t-1}$ × entr. self-efficacy	-0.030	(0.068)	-	-	-	-	0.194	(0.165)
Climate impact (CRI)$_{t-1}$ × entr. alertness	-0.003	(0.054)	-	-	-	-	0.279	(0.156)†
Climate impact (CRI)$_{t-1}$ × entr. fear of failure	-0.065	(0.056)	-	-	-	-	0.243	(0.158)
Climate impact (CRI)$_{t-1}$ × land area (log)	-	-	0.006	(0.013)	-	-	-	-

Table 7 (continued)

Model	(1)		(2)		(3)		(4)	
Dependent variable	Necessity entrepreneurship		Opportunity entrepreneurship		Opportunity entrepreneurship		Social opportunity entrepreneurship	
Statistic	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)
Climate impact $(\text{CRI})_{t-1} \times$ vulnerable industry	-	-	-	-	-0.058	(0.162)	-	-
Observations (countries)	925,438 (94)		964,440 (94)		856,530 (94)		110,326 (57)	
Chi^2	12,165.713		43,177.353		46,374.033		46,374.033	
Log Likelihood	-77,743.809		-177,672.688		-134,007.885		-134,007.885	
AIC^c	155,553.619		355,407.376		268,079.769		268,079.769	

This table displays the results of multilevel (mixed-effects) logistic regression analyses. AIC = Akaike's information criterion. In Model 1, we exclude opportunity-motivated entrepreneurs. In Model 2, we test the moderation between climate impact and land area (log). In Model 3, we exclude entrepreneurs that did not select a specific industry and test the moderation between climate vulnerable industries and climate impact. The reference group for working status is "not working". Standard errors (SE) in parentheses. † $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-tailed tests)

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Data availability The data is available upon reasonable request from the authors.

Declarations

Ethical The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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