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Entrepreneurship and environmental sustainability: the effects of passion and self-efficacy on entrepreneurial intentions

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Abstract

Purpose – This study investigates antecedents determining the inclination to engage in future environmental entrepreneurial activities. Building on passion research and social cognitive theory, the authors explore the role of environmental passion for environmental entrepreneurial intention, drawing attention to the mediating role of environmental self-efficacy.

Design/methodology/approach – A regression-based path analysis for mediation to test the developed hypotheses on a sample of 139 young individuals is applied.

Findings – The results demonstrate a significant positive effect of environmental passion on environmental entrepreneurial intention. The mediation analysis shows a positive direct and indirect effect of passion on intention, concluding that self-efficacy is a partial mediator. The results further suggest that environmental entrepreneurial intention is related to gender. In contrast, covariates like age, entrepreneurial exposure and entrepreneurship education have no significant effect.

Practical implications – The results have implications for practitioners and policymakers who aim to further entrepreneurship for environmental sustainability. It underlines the need to take emotional antecedents seriously, suggests policy for creative and interdisciplinary education with respect to its challenges and emphasizes the roles of teachers in fostering passion.

Originality/value – The results provide a deeper contextualized understanding of passion, self-efficacy and intention in environmental entrepreneurship. These results offer an original perspective of entrepreneurship as a conduit to channel energy, concerns and passionate interests in the natural environment. The study presents

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theoretical implications for passion theory by extending sources of passion and clarifying the direction of self-efficacy in entrepreneurship.

Keywords Environmental entrepreneurship, Environmental passion, Self-efficacy, Intention, Sustainability
Paper type Research paper

Introduction

The environmental crisis and the associated impending disasters (Lenton and Latour, 2018; Steffen *et al.*, 2015) raise new essential questions regarding the role of entrepreneurship to counteract such developments. Entrepreneurship has been discussed as a productive way to facilitate sustainability by implementing innovative products and business models that create environmental value (Gregori *et al.*, 2024; Kuckertz *et al.*, 2019; Lüdeke-Freund, 2020; Markman *et al.*, 2019). Entrepreneurship theory and practice are increasingly concerned with promoting sustainable entrepreneurial initiatives (Johnson and Schaltegger, 2020). The literature identified entrepreneurial intentions as effective means for subsequent action (Kautonen *et al.*, 2015). Increasing the environmental entrepreneurial intention, that is, the inclination to engage in entrepreneurship to solve environmental problems is now a central endeavor of entrepreneurship policy and research (Abdelwahed *et al.*, 2023; Qazi *et al.*, 2021; Wang *et al.*, 2021).

Prior inquiries have been adding to the knowledge of what attitudes, skills and forms of knowledge affect entrepreneurial intentions (Brüne and Lutz, 2020; Nabi *et al.*, 2017; Neneh, 2022). But these results have been derived predominantly from conventional entrepreneurship settings, leaving the context of environmental sustainability comparatively underdeveloped (Lourenço *et al.*, 2013; Sharma *et al.*, 2021). Hence, research argues that it is crucial to contextualize our insights about entrepreneurial intention and to reduce the pending knowledge deficits in regard to what fuels environmental entrepreneurial intention (Qazi *et al.*, 2021; Vuorio *et al.*, 2018; Wang *et al.*, 2021).

Recently, entrepreneurial passion has been identified as a vital but insufficiently explored determinant of entrepreneurial intention (Biraglia and Kadile, 2017; Huyghe *et al.*, 2016; McSweeney *et al.*, 2022; Neneh, 2022). Passion is defined as a strong positive emotional inclination towards specific activities (Vallerand *et al.*, 2003), and such strong emotions are an essential motivator to start and continue entrepreneurial action (Cardon *et al.*, 2012, 2017). Prior work almost exclusively investigated passion for entrepreneurial activities such as founding new ventures, inventing business opportunities and developing the business (Cardon *et al.*, 2013; McSweeney *et al.*, 2022; Neneh, 2022; Newman *et al.*, 2021). Albeit the empirical evidence from conventional entrepreneurship, passion has not yet been adequately transferred to environmental entrepreneurship.

Entrepreneurs report positive feelings toward the natural environment (Gregori *et al.*, 2021b) which indicates the importance of environmental passion (De Bernardi and Pedrini, 2020). However, environmental passion as an alternative and context-specific form of passion has not been sufficiently explored. This impedes a better understanding of this nascent field (De Bernardi and Pedrini, 2020) and the development of a more holistic theory of passion in entrepreneurship (Cardon *et al.*, 2017). In particular, the specific motivational antecedents of and their effects on environmental entrepreneurship remain vague. The postulated antagonistic relationship between entrepreneurial action and environmental concerns (Anderson, 1998; Mars and Lounsbury, 2009) raises the central question whether positive emotions toward the natural environment lead to entrepreneurial action (Robertson and Barling, 2013).

Furthermore, studies draw attention to self-efficacy as a central mechanism influencing the relation between passion and entrepreneurial intention (Baum and Locke, 2004; Murnieks *et al.*, 2014; Neneh, 2022). But self-efficacy's role appears to be equivocal. While some studies report that passion fuels self-efficacy (Baum and Locke, 2004; Murnieks *et al.*, 2014), others argue for the opposite effect (Cardon and Kirk, 2015). Moreover, and similar to passion research, we need

additional work on contextualized forms of self-efficacy for environmental entrepreneurship. Entrepreneurial self-efficacy is a well-established construct that is often associated with entrepreneurial intention. It focuses on the confidence in being able to successfully conduct conventional entrepreneurial tasks such as developing new products or identifying opportunities (Zhao *et al.*, 2005). Considering environmental entrepreneurship, entrepreneurial self-efficacy is inadequate to engage with the mechanism of environmental passion and intention. Since sustainability issues are highly complex problems, we argue that prospective entrepreneurs need environmental self-efficacy. Environmental self-efficacy is defined as the confidence to contribute to solving environmental problems (Huang, 2016). In addition, recent work highlights that the self-efficacy and intention relationship does not hold in every context (Neneh, 2022).

Based on the enigmatic relationships between passion, self-efficacy and entrepreneurial intention, the study is guided by the following research questions:

RQ1. Does environmental passion lead to environmental entrepreneurial intention, and

RQ2. does environmental self-efficacy mediate this relation?

We build on environmental passion (Robertson and Barling, 2013), environmental self-efficacy and environmental entrepreneurial intention constructs (Hockerts, 2017; Huang, 2016). Drawing on prior theorizing we expect a positive relationship between environmental passion and entrepreneurial intention. Moreover, environmental passion and environmental entrepreneurial intention are expected to be mediated by environmental self-efficacy (Hockerts, 2017; Huang, 2016). This model is tested based on a study of 139 young individuals. This population is characterized by high emotional investment in the natural environment (Bright and Eames, 2022; Hamadeh, 2022) and has been widely neglected in entrepreneurship research (Brüne and Lutz, 2020), but is expected to be transformative for the sustainability movement and entrepreneurship (GEM, 2022; Sharma *et al.*, 2021; Vuorio *et al.*, 2018).

The empirical results support the theoretical assumptions. Environmental passion is significantly positively related to environmental entrepreneurial intention and the relationship is partially mediated by environmental self-efficacy. The results provide novel insights into antecedents affecting the intention to engage with environmental entrepreneurial action, expanding the knowledge on alternative forms of entrepreneurial intention (Hockerts, 2017; Thelken and de Jong, 2020; Vuorio *et al.*, 2018). We discuss environmental entrepreneurship as a conduit to channel energy, concerns and interests about the natural environment. This aspect adds a new perspective to research on the entrepreneurial inclinations of young individuals that was previously mainly concerned with entrepreneurship as a way toward financial self-sufficiency (Aloulou *et al.*, 2023; Mehtap *et al.*, 2017; Melak and Derbe, 2022; Ukil and Jenkins, 2023). In addition, we offer theoretical contributions to research on passion in entrepreneurship. By further unraveling the role of environmental passion for entrepreneurship, this study attends to calls to expand the knowledge about the sources of passion (Cardon *et al.*, 2017; Newman *et al.*, 2021) and specifically environmental passion in entrepreneurship (De Bernardi and Pedrini, 2020). The model also adds to a more profound understanding of how a contextualized form of self-efficacy is needed to clarify the direction of the influence of passion and self-efficacy on intention (Murnieks *et al.*, 2014; Neneh, 2022). In addition to the theoretical advancements, the results also hold practical and policy implications. We contribute to the increasingly important intersection of education and environmental sustainability in entrepreneurship (Lourenço *et al.*, 2013; Sharma *et al.*, 2021) and conclude with limitations and future research directions.

Theoretical framework and hypotheses

Issues of environmental sustainability are the most pressing challenges current and future generations face. These critical developments call for global, national and regional action to advance the transition to a livable future that balances environmental and economic

demands. Entrepreneurship research is increasingly interested in alternative ways of doing business that positively contribute to environmental sustainability. This resulted in a research stream called environmental entrepreneurship, interested in how entrepreneurial activity can create innovative solutions to produce environmental value (O'Neil and Ucbasaran, 2016; Vedula *et al.*, 2022; York, 2018; York *et al.*, 2016).

This study analyzes the antecedents of what motivates individuals to start entrepreneurial activities, and thus, their entrepreneurial intention. Intentions are mental states that direct individuals toward behavior and describe a person's readiness to conduct this behavior in the future (Ajzen, 1991, 2011). Hence, it is a central predictor of actual entrepreneurial behavior (Kautonen *et al.*, 2015). Based on prior context-specific applications of entrepreneurial intentions (Fayolle and Liñán, 2014; Hockerts, 2017; Vuorio *et al.*, 2018), environmental entrepreneurial intention is defined as an indication of an individual's readiness to perform entrepreneurial actions such as creating a new organization that seeks to contribute to solving environmental issues.

Prior work on intention of alternative forms of entrepreneurship offered essential insights into distinct antecedents such as the influence of attitudes towards entrepreneurship (Thelken and de Jong, 2020; Vuorio *et al.*, 2018), moral obligation and empathy (Hockerts, 2017), or social responsibility (Wang *et al.*, 2021). These studies emphasized the relations of different personal values, including ecological, biospheric, or altruistic values on intentions (Qazi *et al.*, 2021; Thelken and de Jong, 2020; Vuorio *et al.*, 2018; Wang *et al.*, 2021). Yet, emotional aspects have been widely neglected. This study seeks to investigate emotional antecedents. It aims at developing the link between environmental passion and environmental entrepreneurial intention and the mediating role of environmental self-efficacy. The conceptual model is developed in the following sections and summarized in Figure 1.

Linking environmental passion and intention in environmental entrepreneurship

In the seminal work of Vallerand *et al.* (2003, p. 757), the authors define passion as a "strong inclination toward an activity that people like, that they find important, and in which they invest time and energy". Specifically, they propose the concept of harmonious passion, referring to a voluntary and controlled identification with the defined activity and the associated positive emotions (Curran *et al.*, 2015; Vallerand, 2015). A central element is that passion is context-specific as it emerges in relation to particular activities and not as a general

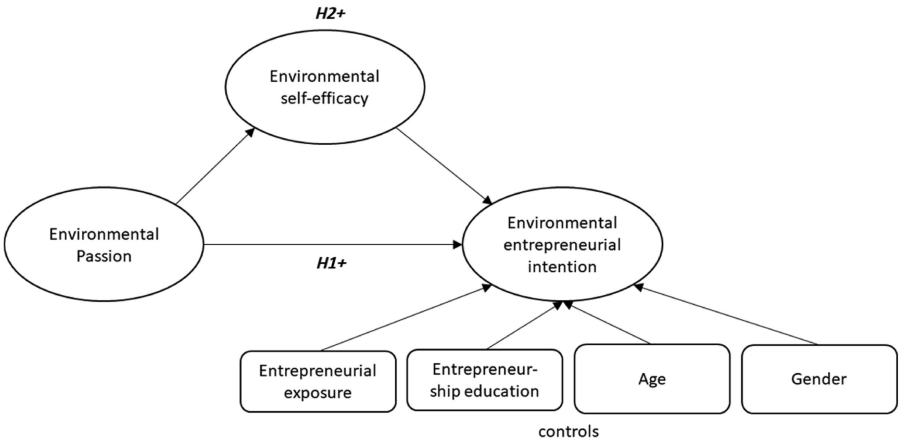

Figure 1.
The conceptual model depicting the effect of environmental passion on environmental intention and the mediating role of environmental self-efficacy

Source(s): Authors' own creation

inclination. Passion occurs when activities are personally valued and meaningful for the individual (Vallerand, 2015; Vallerand *et al.*, 2003).

Inspired by Vallerand and colleagues, passion became central to entrepreneurship research (Cardon *et al.*, 2013, 2017; McSweeney *et al.*, 2022; Newman *et al.*, 2021). Entrepreneurial passion is defined as "consciously accessible intense positive feelings experienced by engagement in entrepreneurial activities associated with roles that are meaningful and salient to the self-identity of the entrepreneur" (Cardon *et al.*, 2009, p. 517). The dominant domain-specific view is concerned with activities comprising founding new ventures, inventing business opportunities and developing the business (Cardon *et al.*, 2013; Cardon and Kirk, 2015). There has been a surge of research studying entrepreneurial passion in relation to entrepreneurial intention in a traditional setting. Entrepreneurial passion for founding and inventing has been positively associated with entrepreneurial intentions in different contexts, while entrepreneurial passion for developing had no statistically significant effect (Biraglia and Kadile, 2017; Huyghe *et al.*, 2016; McSweeney *et al.*, 2022).

However, entrepreneurial passion is insufficient to explain diverse types of intentions. There are potentially different forms of passion at play in explaining why individuals become entrepreneurial (Cardon *et al.*, 2017). First inductive studies reveal that environmental entrepreneurs emphasize their emotional investment in the natural environment (De Bernardi and Pedrini, 2020; Gregori *et al.*, 2021b; Perez Nuñez and Musteen, 2020). Hence, we need to introduce environmental passion to entrepreneurship. Robertson and Barling (2013) defined environmental passion as the positive emotions related to the natural environment. This entails, for example, being passionate about the environment, enjoying environmentally friendly behavior, having strong feelings about environmental values, or experiencing pleasure from caring for the environment (Robertson and Barling, 2013).

Different forms of passion are conceptually and empirically distinct (Cardon *et al.*, 2013; Cardon and Kirk, 2015). Environmental passion has been empirically investigated in settings outside of entrepreneurship. Studies show that higher environmental passion of employees is associated with environmentally friendly behavior at the workplace, including recycling, energy saving, composting, or partaking in environmental programs (Afsar *et al.*, 2016; Peng *et al.*, 2021; Robertson and Barling, 2013; Yin *et al.*, 2021).

Drawing on passion theory, we hypothesize that environmental passion is a motor for environmental entrepreneurial intention. Experiencing passion is energizing and, thus, primarily a motivational construct. Passion occurs and is motivational because the envisioned behavior is experienced as integral to the sense of self, and individuals strive to make it part of their identity (Vallerand, 2015; Vallerand *et al.*, 2003). Passion further entails persistence and effort toward objectives related to domain-specific activities (Vallerand, 2015; Vallerand *et al.*, 2003). In terms of environmental passion, individuals' strong positive feelings towards nature, drive their motivation to engage in pro-environmental behavior and make a difference (Robertson and Barling, 2013). Intentions are robust predictors of behavior (Ajzen, 1991, 2011). Passion is therefore theorized to positively affect the intention to perform the related behavior (Biraglia and Kadile, 2017; Murnieks *et al.*, 2014). Building on this foundation, the following hypothesis is formulated:

H1. Environmental passion is positively related to environmental entrepreneurial intention.

The role of environmental self-efficacy

To further clarify the relationship between environmental passion and environmental entrepreneurial intention, we propose environmental self-efficacy as a mediator. We expect passion to drive self-efficacy, which in turn positively affects intention.

Self-efficacy refers to "people's beliefs about their capabilities to exercise control over events that affect their lives" (Bandura, 1990, p. 128). Similar to passion, it is domain-specific (Bandura, 1977). In entrepreneurship research, self-efficacy is dominantly considered an individual's belief to be able to successfully conduct the necessary entrepreneurial actions (Chen *et al.*, 1998). It describes the confidence in fulfilling certain entrepreneurship-related tasks such as developing new products, identifying opportunities, thinking creatively, or commercializing new ideas (Zhao *et al.*, 2005). As such, it also became a central constituent of the entrepreneurial passion discourse (Cardon and Kirk, 2015; Murnieks *et al.*, 2014; Neneh, 2022).

However, self-efficacy needs to be aligned with the studied context (Bandura, 1977). Scholars call for intensified efforts on other forms of self-efficacy reflecting more diverse entrepreneurial activities, such as environmental entrepreneurship (Hockerts, 2017; Wang *et al.*, 2021). Following such calls, we build on environmental self-efficacy as an individual's confidence to contribute to solving environmental problems (Huang, 2016). This form of self-efficacy covers an individual's judgment to be able to address environmental challenges and consider them solvable (Hockerts, 2017). First studies show that the perception of global events can influence environmental self-efficacy (Wang *et al.*, 2021), but the effect of environmental passion is yet to be investigated.

Extant literature supports relating environmental passion with environmental self-efficacy for two reasons. First, based on social cognitive theory, emotional arousal or affective states are one of the sources of self-efficacy beliefs (Bandura, 1977, 1997). Individuals interpret their self-efficacy based on their emotional state when performing a related task. Negative feelings then lead to the experience of performing poor, and thus, low perceived self-efficacy, whereas pleasant feelings can increase one's confidence (Bandura, 1977). Since environmental passion expresses itself in intense positive feelings, a positive influence on the corresponding self-efficacy is expectable. Second, passion and self-efficacy are conceptually related concerning the engagement in activities integral to one's identity (Huyghe *et al.*, 2016). Individuals who experience a passionate interest in specific activities will engage in behavior that improves their ability, and consequently, their self-efficacy (Baum and Locke, 2004; Murnieks *et al.*, 2014). Based on this, we contend that individuals passionate about the environment engage in pro-environmental behavior that positively influences their confidence in solving sustainability issues.

The second relationship of the proposed mediation is between self-efficacy and intention. In the context of traditional entrepreneurs, this relationship is well documented (Liñán and Fayolle, 2015; Newman *et al.*, 2019; Zhao *et al.*, 2005). Despite this, recent work laments that this association does not hold in every context, leading to unclear results that call for further investigation (Hsu *et al.*, 2019; Neneh, 2022; Newman *et al.*, 2019). Similarly, while environmental self-efficacy has been identified as a central predictor for pro-environmental behavior (Chen *et al.*, 2015; Huang, 2016), additional work is needed to explore its role in entrepreneurship (Wang *et al.*, 2021).

Social cognitive theory argues that self-efficacy is central to personal capability judgment. It is connected to the choice of and the effort and persistence one exerts in specific tasks. Low self-efficacy leads to avoidance of the tasks that one does not feel capable of doing, whereas high efficacy leads to engagement. As such, self-efficacy is a key determinant of behavioral intention (Bandura, 1997). A core aspect of environmental entrepreneurship is that the involved actors seek to mitigate environmental problems and create environmental value (Antolin-Lopez *et al.*, 2019; York, 2018). Because issues of environmental sustainability are complex and difficult to solve, potential entrepreneurs need confidence in their ability to engage with this daunting task; hence, environmental self-efficacy.

Taken together, in addition to the direct relationship between environmental passion and environmental entrepreneurial intention, we hypothesize that there is also an indirect relation through the mediator of environmental self-efficacy. We propose the following hypothesis:

H2. Environmental self-efficacy mediates the relationship between environmental passion and environmental entrepreneurial intention.

Methodology

Study design and sampling

This study opts to test the proposed model in a sample of young individuals. We argue that the environmental crisis is especially salient for young generations because they will experience the negative consequences more profoundly. Thus, the environmental crisis is a highly emotional topic for this population (Bright and Eames, 2022; Wallis and Loy, 2021). Young individuals are characterized by high environmental awareness and emotional investment (Bright and Eames, 2022; Hamadeh, 2022) and increasingly express dissatisfaction with current political and economic endeavors (Henn *et al.*, 2022; Sloam *et al.*, 2022). This discontent is observable in changing consumption but also in activism and protests like the "Friday for Future" movement or more radical actions associated with the "Last Generation" (Marris, 2019; Wallis and Loy, 2021).

Moreover, young individuals have not yet started a business. They lack entrepreneurial experiences that might have fostered entrepreneurial passion and self-efficacy. Hence, this generation may rely on environmental passion when engaging with entrepreneurship (De Bernardi and Pedrini, 2020). In addition, young individuals other than university students have been widely neglected (Brüne and Lutz, 2020; Elert *et al.*, 2015). Yet, it is precisely these young individuals that are attested transformative potential concerning entrepreneurship and the sustainability movement (Sharma *et al.*, 2021; Vuorio *et al.*, 2018). Further, they have a higher likelihood of starting a business aimed at making a difference in the world (GEM, 2022).

To get access to this population, we focused on higher vocational education institutions in Austria. We addressed Secondary Colleges for Business Administration, because they anchor entrepreneurship education as one of the main principles in their curricula (OeaD, 2020). They also seek to foster students' personal development, support their independence and help them to act responsibly (Weger, 2020). In cooperation with the Federal State's Board of Education the questionnaire was administered between December 2021 and February 2022.

Data collection and sample structure

A statistical power analysis (Cohen, 1992) using the GPower 3.1 software with effect sizes of ≥ 0.15, 5% α error probability, 95% power ($1 - \beta$ error probability), and four predictors of the dependent variable was performed *a priori*. The analysis reveals a minimum sample size of 129 cases. An initial sample of 176 complete cases was collected. Upon thorough engagement with the data, 20 cases were identified as either "straight-liners" (cut-off: standard deviation across all model items <0.25) or statistical outliers (e.g. "speeders") and hence dropped. Next, the response behavior for the dependent variable items, including one reverse-coded item, was analyzed (Hair *et al.*, 2018). The analysis revealed that 17 cases had to be excluded due to implausible responses (i.e. false response to the reverse coded item). The final sample size of 139 cases still exceeds the required target size. The sample characteristics and control variables are reported in Table 1.

The relations between individual environmental passion, environmental self-efficacy and intention to become active as an environmental entrepreneur were investigated. These are internal determinants, and thus, the study is based on a single-informant design. The subsequent procedure followed the literature to reduce the probability of common method bias (Podsakoff *et al.*, 2003). For instance, the respondents were asked for honest answers and were assured anonymity to reduce social desirability bias. The questionnaire used short, focused and simple items that respondents could answer easily and spontaneously. In addition, it further relied on fact-based statements (e.g. "I am passionate about the

	Number	(Percentage)		Number	(Percentage)
Gender			*Entrepreneurial exposure parents*		
Male	41	(29.5)	No	89	(64)
Female	98	(70.5)	Yes	50	(36)
Age			*Entrepreneurship education*		
14	8	(5.8)	1	4	(2.9)
15	9	(6.5)	2	3	(2.2)
16	31	(22.3)	3	9	(6.5)
17	29	(20.9)	4	14	(10.1)
18	32	(23)	*5*	20	(14.4)
19	22	(15.8)	6	24	(17.3)
20	6	(4.3)	7	65	(46.8)
21	1	(0.7)			
22	1	(0.7)			

Table 1.
Sample characteristics

Note(s): $n = 139$
Source(s): Authors' own creation

environment", "Solving environmental problems is something each of us can contribute to.") that respondents could clearly agree or disagree with. We mixed the different items to have respondents read the single items more thoroughly and to avoid recognition of the independent and dependent variables. The full list of items of the main constructs is provided in Table 2. Harman's single-factor test was applied to examine indications of common method

Construct/Item	Loadings		AVE	α	CR
Environmental entrepreneurial intention (based on Hockerts, 2017)			0.51	0.74	0.75
EEI1: I expect that at some point in the future I will be involved in launching an organization that aims to solve environmental problems	0.90	***			
EEI2: I have a preliminary idea for an environmental enterprise on which I plan to act in the future	0.50	***			
EEI3 I do not plan to start an environmental enterprise.*	0.69	***			
Environmental passion (based on Robertson and Barling, 2013)			0.53	0.90	0.90
EP1: I am passionate about the environment	0.75	***			
EP2: I enjoy practicing environmentally friendly behaviors	0.71	***			
EP3: I enjoy engaging in environmentally friendly behaviors	0.76	***			
EP4: I take pride in helping the environment	0.80	***			
EP6: I get pleasure from taking care of the environment	0.83	***			
EP7: I passionately encourage others to be more environmentally responsible	0.67	***			
EP9: I have voluntarily donated time or money to help the environment in some way	0.63	***			
EP10: I feel strongly about my environmental values	0.63	***			
Environmental self-efficacy (based on Hockerts, 2017)			0.53	0.64†	0.68
ESE1 I am convinced that I personally can make a contribution to address environmental challenges if I put my mind to it	0.88	***			
ESE3: solving environmental problems is something each of us can contribute to	0.54	***			

Table 2.
Results of confirmatory factor analysis

Note(s): *Item reverse coded
†Spearman-Brown
***$p < 0.001$ (two-tailed)
Source(s): Authors' own creation

bias (Harman, 1967). An exploratory factor analysis with all reflective multi-item measures was conducted. The unrotated solution extracted three factors with eigenvalues greater than one, with none of these factors accounting for the majority of the variance.

Measures

We used reflective multi-item measures with seven-point Likert-type scales ranging from 1 ("strongly disagree") to 7 ("strongly agree") for all multivariate constructs. The measures for environmental passion were taken from Robertson and Barling (2013), environmental self-efficacy and environmental entrepreneurial intention are adapted from Hockerts (2017). Some items were slightly altered to reflect the study context. Hence, all constructs were taken from the literature and were tested extensively in diverse contexts. In addition, several covariates were added to examine whether the results are subject to spurious association. We included a dichotomous variable to control for gender effects. Prior work argues for differences between individuals identifying as females and males, where females reported lower self-efficacy and intentions (Wilson *et al.*, 2007). We also controlled for differences in entrepreneurship education as a determinant of intention. Respondents were asked how often they are confronted with entrepreneurship-related concepts in school (Gregori *et al.*, 2021a). In addition, prior work drew attention to the relevance of entrepreneurial exposure for intention (Gird and Bagraim, 2008). Subsequently, an item whether their parents had engaged in entrepreneurial activity was added.

Scale properties

First, an exploratory factor analysis (EFA) in SPSS 28 was performed to assess the data structure and define the fundamental constructs (Hair *et al.*, 2018). We used principal component analysis (PCA) with varimax rotation. This procedure confirmed three factors with eigenvalues >1 that explain 64.65% of the variance (KMO = 0.881; χ^2 = 1,000,568; df = 120; Bartlett $p < 0.001$). Due to communality <0.5 and a cross-loading >0.4 (Hair *et al.*, 2018), one item from the environmental self-efficacy scale (ESE2) was removed. Based on the communality statistics, two items from the environmental passion scale (EP5 and EP8) were omitted from subsequent analysis (Child, 2006).

Second, tests related to the scales' validity and reliability were performed. The Cronbach's alpha for environmental entrepreneurial intention was 0.74, and for environmental passion, it was 0.89, confirming internal consistency. After eliminating one item, the environmental self-efficacy scale was measured with two items. This move follows the literature (Eisinga *et al.*, 2013) that recommends using the Spearman-Brown coefficient instead of Cronbach's alpha in such cases. The coefficient was 0.64. Next, the composite reliability scores (CR) were calculated that are less biased towards the number of items (Netemeyer *et al.*, 2003). CR-scores of 0.75 for environmental entrepreneurial intention, 0.68 for environmental self-efficacy and 0.90 for environmental passion support internal consistency.

Third, the scales' unidimensionality was tested by conducting PCA (varimax rotation) and separately including the constructs' items. Unidimensionality is given as each exploratory factor analysis only extracted one factor with eigenvalues greater than one (Hair *et al.*, 2018).

Fourth, to assess the appropriateness of the extracted factor structure concerning overall model fit, internal reliability, dimensionality, discriminant and convergent validity, confirmatory factor analysis (CFA) with maximum likelihood estimation was performed in AMOS 28. This entails specifying a correlation model with the three dimensions and their respective items. The measurement model provided an adequate fit (Byrne, 2016; Hu and Bentler, 1998). Average item loadings for all constructs were well above the threshold of 0.4 and were significant. In sum, the results demonstrate indicator reliability. At the construct level, all constructs' average variance extracted (AVE) was >0.5. Discriminant validity is

achieved as each construct's square root was higher than its correlation with all other constructs (Fornell and Larcker, 1981). The results are summarized in Table 2.

Finally, potential multicollinearity was assessed by calculating the variance inflation factors (VIF). All VIF scores are clearly below the recommended threshold of 5 (Hair *et al.*, 2018).

In Table 3, the correlations between individual dimensions are reported. Correlations can be considered moderate to large (Cohen, 1992), indicating that the dimensions do not capture unrelated or redundant aspects. Thus, convergent validity is supported.

Results

We use a regression-based path analysis for mediation (PROCESS v4.1) to test the proposed model (Hayes, 2022). The model includes an indirect effect of our causal antecedent variable *environmental passion* on our consequent variable *environmental entrepreneurial intention* through the mediator variable *environmental self-efficacy,* and a direct effect of *environmental passion* on *environmental entrepreneurial intention*.

The PROCESS macro allows for estimating unstandardized path coefficients for total, direct and indirect effects (Table 4). The results demonstrate a significant positive effect of environmental passion on environmental entrepreneurial intention (Model 1), explaining 26.9% of the variance. More environmental passion thus increases the intention to become active as an environmental entrepreneur. Hence, the data supports the direct effect suggested in Hypothesis 1. There are no statistically significant effects of gender, age, entrepreneurship education, or entrepreneurial exposure through parents.

The mediation effect (Hypothesis 2) is tested in two steps. First, two models are computed. One model estimates the path from the independent to the mediator variable and the other model that from the mediator to the dependent variable (Hayes, 2022). If environmental self-efficacy acts as a mediator, the effect of environmental passion on environmental self-efficacy is significant. In addition, environmental passion's direct effect on entrepreneurial intention should decrease when environmental self-efficacy is added to the model. The data further supports these assertions and shows a significant positive effect of environmental passion on environmental self-efficacy (Model 2) and of self-efficacy on environmental entrepreneurial intention (Model 3). As expected, the effect of environmental passion on environmental entrepreneurial intention decreases. Thus, the data supports Hypothesis 2. The models explain

	M	SD	AVE	1	2	3	4	5	6
1. Environmental entrepreneurial intention	3.11	1.36	0.51	*0.72*					
2. Environmental passion	4.13	1.44	0.53	0.47**	*0.73*				
3. Environmental self-efficacy	5.86	1.25	0.53	0.33**	0.42**	*0.72*			
4. Gender	0.29	0.458		0.04	−0.26**	−0.22*			
5. Age	17.22	1.59		0.05	−0.05	0.08	0.08		
6. Entrepreneurship education	5.70	1.61		0.19*	0.27**	0.31**	0.00	0.09	
7. Entrepreneurial exposure parents	0.36	0.482		0.07	−0.09	0.00	0.11	−0.06	−0.06

Note(s): [a]Bi-variate correlations **$p < 0.01$, *$p < 0.05$ (two-tailed)
Square root of AVE for each factor reported along the diagonal (italics)
Gender (0 = female, 1 = male) $n = 139$
Source(s): Authors' own creation

Table 3.
Correlations

Outcome	Model 1 Environmental entrepreneurial intention		Model 2 Environmental self-efficacy		Model 3 Environmental entrepreneurial intention	
Predictor	Coefficient (s.e.)	p	Coefficient (s.e.)	p	Coefficient (s.e.)	p
Intercept	−0.249 (1.18)	0.833	2.49 (1.21)	0.042	−0.705 (1.12)	0.530
Environmental passion	0.482 (0.07)	<0.001	0.289 (0.073)	<0.001	0.429 (0.073)	<0.001
Environmental self-efficacy					0.184 (0.078)	0.020
Gender	0.460 (0.25)	0.069	−0.400 (0.210)	0.059	0.533 (0.256)	0.040
Age	0.050 (0.07)	0.471	0.075 (0.064)	0.248	0.035 (0.067)	0.599
Entrepreneurship education	0.050 (0.06)	0.432	0.167 (0.069)	0.018	0.020 (0.059)	0.741
Entrepreneurial exposure parents	0.305 (0.22)	0.167	0.176 (0.189)	0.352	0.273 (0.217)	0.211
R^2	0.269	<0.001	0.244	<0.001	0.290	<0.001

Note(s): PROCESS (Model 4)
$n = 139$
Source(s): Authors' own creation

Table 4.
Mediation results (PROCESS)

24.4 and 29.0% of the variance, respectively. Concerning the covariates, age and entrepreneurial exposure through parents have no significant effects in either model. Gender, however, has a significant positive effect in model 3 as male students have higher levels of environmental entrepreneurial intention. Entrepreneurship education shows a significantly positive effect on environmental self-efficacy in model 2. This means that students with perceived higher levels of entrepreneurship education evaluate their environmental self-efficacy higher.

Second, a 95% percentile bootstrap confidence interval is generated leveraging 5,000 bootstrap samples and heteroscedasticity-consistent covariance matrix errors (HC3) (Davidson and MacKinnon, 1993; Hayes, 2022) to test the direct and indirect effects of the mediation. As the confidence interval is above zero, the estimated effects are positive. The mediation analysis shows a significant total effect of 0.48. The direct (0.43) and indirect (0.05) effects are significant, confirming that environmental self-efficacy is a partial mediator between environmental passion and environmental entrepreneurial intention. The results of the mediation effect test are reported in Table 5 and further support Hypothesis 2. Following Pollack *et al.* (2012), we summarized the research model and results in Figure 2 by providing the estimates of Model 2 and 3 as shown in Table 4.

Mediation effect of the independent variable	Environmental passion Effect (s.e.) [LLCI; ULCI]
Total effect	0.48 (0.071)
[95% bootstrapped confidence interval]	[0.341; 0.622]
Direct effect	0.43 (0.073)
[95% bootstrapped confidence interval]	[0.284; 0.573]
Indirect effect	0.05 (0.028)
[95% bootstrapped confidence interval]	[0.006; 0.117]

Note(s): Dependent variable: environmental entrepreneurial intention; mediator: environmental self-efficacy
[a]Bootstrapping with 5,000 subsamples and 95% confidence interval; PROCESS (Model 4)
$n = 139$
Source(s): Authors' own creation

Table 5.
Mediation effect test results (PROCESS)[a]

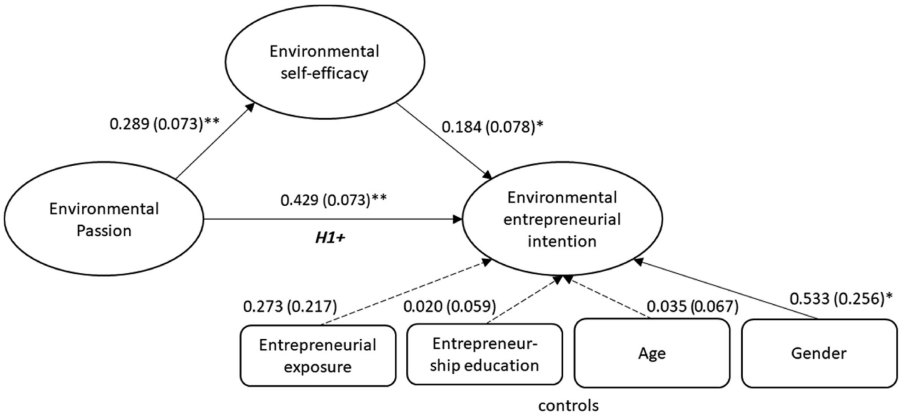

Figure 2.
Model and results

Note(s): Solid lines indicate significant paths and dashed lines indicate nonsignificant paths. $*p < 0.05$; $**p < 0.01$
Source(s): Authors' own creation

Discussion

The results offer novel insights into the relationship between environmental passion and environmental entrepreneurial intention that contribute to research on entrepreneurship aiming at environmental sustainability (Anderson, 1998; Gregori *et al.*, 2021b; Vedula *et al.*, 2022). Specifically, we advance the contextualized role of passion and self-efficacy as antecedents of entrepreneurial intention. Hence, the results add to the increasingly voiced calls for a contextualized understanding and broadening of the domain of entrepreneurship (Welter *et al.*, 2017, 2019).

The positive effect of environmental passion emphasizes intense positive feelings for nature as a central influencing factor for a potential engagement with environmental entrepreneurship. This contrasts prior research which has largely neglected such an effect (De Bernardi and Pedrini, 2020; Perez Nuñez and Musteen, 2020). Moreover, there is growing empirical evidence that the positive association between self-efficacy and intention does not hold in every context (Neneh, 2022). We identified a significant positive relationship between the two variables. The results further establish environmental self-efficacy as a partial mediator. The positive relationship between environmental self-efficacy and intention aligns with research in other contexts (Hockerts, 2017). However, it also contradicts recent work that found no significant relation between environmental self-efficacy and environmental entrepreneurial intentions (Wang *et al.*, 2021). Thus, our study offers a more nuanced view of the influence of environmental passion, drawing attention to the direct and indirect effect it exerts on the intentions of individuals. The results extend literature interested in antecedents of alternative forms of entrepreneurship such as environmentally-sustainable endeavors (Hockerts, 2017; Thelken and de Jong, 2020; Vuorio *et al.*, 2018).

The results also provide a novel perspective on intentions to engage with environmental entrepreneurship. Previous work has shown that passion for founding leads to a higher entrepreneurial intention (Biraglia and Kadile, 2017; Neneh, 2022). But how other forms of passion translate into entrepreneurship is not as straightforward (Cardon *et al.*, 2017). In this study, we are confronted with potential tensions in the mental model of individuals concerning the positive affective states toward the environment and entrepreneurial action (Anderson, 1998; Mars and Lounsbury, 2009). Despite this, our hypothesized relationship was

empirically supported. Thus, entrepreneurship can be a conduit to channel individuals' energy, concerns and passionate interests in the natural environment. This results contribute to exploring the entrepreneurial tendencies of young individuals (Aloulou *et al.*, 2023; Mehtap *et al.*, 2017; Melak and Derbe, 2022; Ukil and Jenkins, 2023; Vuorio *et al.*, 2018), especially in the less researched pre-university context (Brüne and Lutz, 2020; Elert *et al.*, 2015). Previous endeavors predominantly focused on the role of entrepreneurship in offering an emancipatory mode to becoming financially self-sufficient, which is especially crucial in contexts deprived of favorable labor markets (Aloulou *et al.*, 2023; Mehtap *et al.*, 2017; Pukkinen *et al.*, 2023). Adding to this notion, environmental passion is related to the readiness to perform entrepreneurial behaviors in the future. Thus, the energy and transformational potential of activism and protests (Henn *et al.*, 2022; Sloam *et al.*, 2022; Wallis and Loy, 2021) might be directed towards productive entrepreneurial action.

Theoretical implications

The results have theoretical implications for passion research in entrepreneurship in two ways. First, we contribute to a more holistic theory of passion in entrepreneurship by extending previous conceptions with passion towards the natural environment. As the first attempt to quantitatively study environmental passion in entrepreneurship, we address calls for more research on the crucial role of passion in environmental entrepreneurship (De Bernardi and Pedrini, 2020; Perez Nuñez and Musteen, 2020). Second, we further develop passion theory by contextualizing self-efficacy and clarifying the link between passion, self-efficacy and entrepreneurial intention.

Our results support the calls to extend the domain of passion in entrepreneurship as a prerequisite for a more in-depth understanding of the breadth of entrepreneurship (Cardon *et al.*, 2017). Passion research in entrepreneurship is dominated by passion for activities typically associated with establishing a business or being an entrepreneur (Dakung *et al.*, 2023; Huyghe *et al.*, 2016; Maryami *et al.*, 2023; McSweeney *et al.*, 2022). This view on passion and the developed scales restrict entrepreneurship to three domains: founding a new venture, inventing and developing a business (Cardon *et al.*, 2009, 2013). Despite the importance of prior research, such restrictions are problematic (Cardon *et al.*, 2017). On the one hand, passion towards only three types of activities is unlikely to help us understand different forms of entrepreneurship (Welter *et al.*, 2017). On the other hand, scholars noted the difficulty in establishing the relationships between entrepreneurial passion and individuals who never had the chance to engage in entrepreneurial activities (Biraglia and Kadile, 2017; Neneh, 2022). A large part of entrepreneurial passion, such as developing product prototypes, convincing investors, motivating employees or owning a company (Cardon *et al.*, 2013), is not widely applicable when studying entrepreneurial intentions in these contexts. Noting these challenges, we extend the literature with the first study that quantitatively investigates the distinct notion of environmental passion (Robertson and Barling, 2013) in entrepreneurship.

In addition, this study also draws attention to the multifaceted nature of passion in entrepreneurship, and thus, the need to extend our conceptual apparatus. Passion can also be directed towards abstract "causes, ideals, and even other people" (Vallerand, 2015, p. 7). While entrepreneurship scholars emphasized other objects of passion, such as growth, the product, or a social mission (Cardon *et al.*, 2017), passion research currently lacks the conceptual tools to engage with these different objects of passion. Building on our results, showing the importance of nature as such an abstract object, we argue that more work is needed to extend passion theory in entrepreneurship. We suggest starting theorizing what these objects of passion can be and how they fuel intense feelings in individuals to become entrepreneurial.

To further the theorizing in this regard, one can connect passion research with research on the emotional aspects of institutional theory. This vantage point allows us to theorize objects

of passion as institutionalized and intersubjective meaning systems that organize practice and offer the foundation for identification (Friedland, 2018; Lok, 2018). This notion fits well with the conceptualization of passion that materializes in specific activities, which are meaningful for the self of the individual (Cardon *et al.*, 2013; Vallerand *et al.*, 2003). In our case, nature is the object of passion and, thus, a ground for emotional investment and meaningful experiences in entrepreneurial processes (Gregori *et al.*, 2021b). The natural environment is theorized as ordering productive material practices of valuation, such as conservation and renewability of nature and life (Friedland, 2018; Gregori and Holzmann, 2022; Thévenot *et al.*, 2000). Hence, the study demonstrates how a different form of passion, evolving around nature as a desirable good, becomes an essential antecedent for entrepreneurship. We believe that this opens new avenues for passion theory.

In addition, we further contribute to passion research in unraveling the role of environmental self-efficacy for environmental entrepreneurial intention. Like with passion, entrepreneurship research on self-efficacy established task-dependent conceptualizations focusing on creativity, product development and opportunity identification (Newman *et al.*, 2019). While this approach resulted in path-breaking studies, our results suggest a need to widen and explore different forms of self-efficacy. Sustainability is frequently concerned with contradicting goals and values and the complexities and uncertainties they entail (Antolin-Lopez *et al.*, 2019; Gregori and Holzmann, 2020; O'Neil and Ucbasaran, 2016; York, 2018; York *et al.*, 2016). This necessitates other forms of self-efficacy beyond the confidence to create a new venture. Hence, contextualization is crucial for understanding the relationship between environmental sustainability and entrepreneurship (Holzmann and Gregori, 2023; Johnson and Schaltegger, 2020; Vedula *et al.*, 2022).

Our results also add to clarifying the relationship between passion and self-efficacy. Passion research has shown that positive feelings increase engagement with activities, and thus, self-efficacy (Baum and Locke, 2004; Murnieks *et al.*, 2014; Neneh, 2022). Other studies also argue for a reversed relationship (Cardon and Kirk, 2015). The reasoning for the latter is that people with high self-efficacy have potentially good performance, leading to positive feelings. Hence, the question is what comes first: passion or self-efficacy. Our results contribute to this conundrum. We argue that the direction of the path most likely depends on the type of passion and advocate for context-sensitive theorizing. Based on our findings and prior work (Robertson and Barling, 2013), we consider it unlikely that positive feelings for the environment emerge because individuals feel that they can perform well in pro-environmental activity.

Practical implications

The results also hold practical implications for policymakers, especially in the area of educational institutions. Preparing individuals for an uncertain and challenging socioecological future becomes increasingly important. Developing and implementing educational settings that enable and prepare students to become entrepreneurs is an essential tasks of policymakers (Cooke *et al.*, 2021). We follow calls to take emotions in entrepreneurship education seriously (Gielnik *et al.*, 2017). While there is a growing awareness of the importance of emotions in entrepreneurship, the literature mainly focuses on coping with the adverse effects of entrepreneurial processes (Aly *et al.*, 2021). However, our results suggest that education should also aim to develop a reasonable passionate interest and convey a sense of environmental self-efficacy. It is essential to frame the grand socioecological challenges not insurmountable but approachable.

Based on the importance of environmental passion and self-efficacy, the results support calls that policymakers should aim to implement interdisciplinary and creative educational settings (Krajger *et al.*, 2021; Lans *et al.*, 2014). In the presented model, controlling for

traditional entrepreneurial education and exposure did not produce significant results. This further underlines the importance of environmental passion and self-efficacy in comparison. Although this is an interesting result, it is advised not to draw radical conclusions about the educational content. Environmental entrepreneurship is often framed as a hybrid endeavor that entails conflicting interests between commercial and environmental practices and values (Antolin-Lopez *et al.*, 2019; York *et al.*, 2016). Elevating students' environmental passion and confidence cannot replace the necessary skills and knowledge about more traditional aspects of entrepreneurship. Education should not only spark intentions (Bandera *et al.*, 2020) but also provide the tools required to enact passion successfully. Hence, interdisciplinarity can become a double-edged sword as it might provoke tensions between entrepreneurship and environmental sustainability. It is recommended to consider such tensions when developing education policy. There is a particular need to scrutinize how different values relate and engage with potential contradictions to provide a realistic view of environmental entrepreneurship (Gregori *et al.*, 2021b).

Based on this discussion, teachers apparently play a central role (Halberstadt *et al.*, 2019), Training teachers for complex tasks holds paramount implications for policy. In an organizational setting, the entrepreneur's passion positively influences the affective commitment of her employees (Hubner *et al.*, 2020), indicating that passion might be contagious (Cardon, 2008). Similar results were achieved in classrooms (Gilal *et al.*, 2019), implying that the teachers' passion is crucial (Anderson *et al.*, 2022; Ismayilova and Bolander Laksov, 2022). Taking together, promoting passion and confidence in environmental entrepreneurship is complex. Education policy should consider that teachers must combine different forms of knowledge, balance potential tensions between topics, create new learning contexts and be passionate. Hence, policies are required that enable teachers to become entrepreneurial themselves. This does not necessarily have to include venture foundation but being collaborative, opportunity-oriented, visionary, motivated, innovative in their approaches and emotionally dedicated (Keyhani and Kim, 2021).

Limitations and future research

While this study offers core contributions to entrepreneurship, it also has limitations that can provide starting points for further research. The study introduced and quantitatively tested the effects of environmental passion and its relation to environmental self-efficacy, arguing for a broader view of passion in entrepreneurship research. This raises the question of how environmentally-contextualized forms of passion and self-efficacy relate to other types, especially those that are more concerned with aspects such as opportunity identification, creativity and product development (Cardon *et al.*, 2013; Newman *et al.*, 2019). Future research could extend the proposed model by integrating other forms of passion and self-efficacy. This engagement would allow research to draw conclusions on the effects and relations of different forms of passion and self-efficacy.

In contrast to research in entrepreneurship that mainly focused on university students, this inquiry deliberately focused on a sample of younger individuals. This focus further allowed the study to offer new insights concerning the forms of passion and practical implications. However, it also limits generalizability, and future research is advised to engage with this crucial aspect of environmental passion in different settings. This is important since the intention-behavior gap could be especially pronounced in this population. An additional understanding of how the intention of young individuals translates into actual behavior (e.g. entrepreneurial action or choice of future studies) is needed. In a related notion, our sample has particularities like in every study. For instance, future studies can investigate the differences in environmental passion in different national or social contexts. In addition, environmental passion could be important for the intention to become an environmental

entrepreneur and other outcomes such as persistence or well-being (Cardon and Kirk, 2015; Chen *et al.*, 2022). Persistence might be especially central since environmental entrepreneurs are prone to self-sacrifice when they strive to preserve nature and create a positive impact (Gregori *et al.*, 2021b).

Lastly, we propose some practical policy implications, but crucial questions remain. Future research is advised to systematically evaluate how such policies lead to educational settings that affect environmental passion and self-efficacy of young individuals. This aim necessitates accounting for temporal aspects, which the presented cross-sectional design cannot do. Future research should carry out longitudinal quasi-experimental designs to expand the understanding of the presented research model. Furthermore, a qualitative engagement with the research question could provide additional insights into the proposed relationships (Venkatesh *et al.*, 2013). These are worthwhile steps to understand why young individuals consider environmental entrepreneurship as an effective means to tackle profound sustainability challenges and the ways to design and evaluate novel education approaches that support them.

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