Sustainable Development

WILEY

Sustainable Development

RESEARCH ARTICLE OPEN ACCESS

From Environmentalist to Ecopreneur? Target Groups and Role Models as Key Elements in Sustainable Entrepreneurship Education

Jacob Hörisch[1] | Maren Fokuhl[1] | Maike Buhr[1] | Petra Dickel[2]

[1]Centre for Sustainability Management, School of Sustainability, Leuphana University Lüneburg, Lüneburg, Germany | [2]Faculty of Media, Kiel University of Applied Sciences, Kiel, Germany

Correspondence: Jacob Hörisch (jacob.hoerisch@leuphana.de)

Received: 9 May 2025 | **Revised:** 22 September 2025 | **Accepted:** 1 October 2025

Funding: This research was financially supported by a grant from the German Federal Environmental Foundation (Grant number: 37741/01-44).

Keywords: entrepreneurship education | interventions | quantitative research | role models | sustainable entrepreneurship | sustainable entrepreneurship competences | target groups

ABSTRACT

This research analyses the effects of different types of educational interventions for sustainable entrepreneurship. We conducted 14 interventions for sustainable entrepreneurship and employed a pretest-posttest study of 148 participants. Mediated regression analysis shows that educational interventions for sustainable entrepreneurship increase sustainable entrepreneurship competences, which in turn positively relate to entrepreneurial intention. Specifically, the results show that environmentalists are a particularly receptive target group for sustainable entrepreneurship interventions, as the increase in competences (and hence intentions) is significantly stronger compared to other target groups. Likewise, we find indications that including role models in sustainable entrepreneurship interventions fosters the increase in competences. Based on these findings, we highlight the benefits of tailored educational interventions for sustainable entrepreneurship among environmentalists. Such interventions could be integrated into sustainability and environmental sciences programs and involve direct contact with role models.

1 | Introduction

Sustainable entrepreneurs play a pivotal role in fostering sustainable development (e.g., Ebabu et al. 2025; Johnson and Schaltegger 2020; Muñoz and Cohen 2018; Shabbir 2023). To be able to contribute to sustainable development via entrepreneurial activity, individuals require a broad set of competences (Álvarez-García et al. 2022; Leal Filho et al. 2025). These include not only conventional entrepreneurial competences, such as entrepreneurial self-efficacy, opportunity competence, or business competence, but also sustainable development competences, such as system thinking competence, normative competence, or interdisciplinarity (Diepolder et al. 2021; Lans et al. 2014; Ploum et al. 2018). However, the combination of such competences is quite unique, and only few individuals will be readily equipped with the necessary set of competences, and even fewer of these individuals with adequate competences will additionally share the intention to start a business. Consequently, educating potential sustainable entrepreneurs regarding these competences and respective intentions is of utmost importance.

Still, only little knowledge exists on which target groups are most promising for sustainable entrepreneurship education (e.g., Fokuhl et al. 2025; Leal Filho et al. 2025). Participants of sustainable entrepreneurship programs differ in their sustainability beliefs, awareness, knowledge, expectations, as well as their personality and socio-demographic characteristics (Fokuhl et al. 2025; Leal Filho et al. 2025). However, those individual differences are rarely addressed in the sustainable entrepreneurship education literature. In particular, most attempts

to foster sustainable entrepreneurship aim at entrepreneurial individuals, while only few education interventions are designed towards environmentalists (e.g., Agu et al. 2021; Gast et al. 2017; Kuckertz and Wagner 2010). Likewise, only little knowledge exists on which type of such interventions is most effective. Diepolder et al. (2024) as well as Vuorio et al. (2018) for example, argue that contact with role models could improve participants' level of sustainability-oriented entrepreneurial intentions. Morgenroth et al. (2015, 4) define role models as "individuals who influence role aspirants" achievements, motivation, and goals by acting as behavioral models, representations of the possible, and/or inspirations'.

Thus, while there is growing agreement on the importance of sustainable entrepreneurship (Ike 2025) and the necessity to equip entrepreneurs with the necessary competences and intentions (Diepolder et al. 2025), it remains underexplored which educational interventions among which target groups are most effective in this regard. Our research focuses on environmentalists as target groups, i.e., individuals who actively demonstrate their environmental engagement (Tesch and Kempton 2004) by pursuing environmental studies and joining environmental groups. The rationale of this paper is that this target group can be a fruitful ground for sustainable entrepreneurship interventions as they are already self-selected into sustainable programs. Therefore, *this research analyzes how sustainable entrepreneurship interventions can enhance the competences and intentions of environmentalists compared to non-environmentalists and whether contact with sustainable entrepreneurs as role models can shape the effectiveness of such interventions*.

To address this research question, we conducted fourteen interventions for sustainable entrepreneurship. These interventions were not limited to students but addressed a broad audience (including environmentalists, i.e., those individuals who actively demonstrate their environmental engagement by pursuing environmental studies or joining environmental groups, and non-environmentalists, i.e., individuals who do not show this active self-selection into such activities) (cf. Tesch and Kempton 2004). The interventions comprised different formats, such as field trips, workshops, lectures, seminars, summer camps, and talks by sustainable entrepreneurs. A pretest-posttest design was chosen to examine the effect of the interventions on sustainable entrepreneurial competences and intentions. Overall, 148 participants fully completed both a survey before the intervention (pretest) and a follow-up survey after the intervention (posttest). The results of a mediated regression analysis indicate the efficacy of interventions for sustainable entrepreneurship. Specifically, we find that interventions among environmentalists can spur a stronger increase in sustainable entrepreneurial competences compared to interventions among non-environmentalists. In turn, higher levels of sustainable entrepreneurial competences are related to higher entrepreneurial intentions. These findings highlight the potential of approaching environmentalists as a new, promising target group for sustainable entrepreneurship education. Additionally, this research reveals how to equip this target group with the necessary competences to implement their environmental ideas through entrepreneurial endeavors, particularly discussing the potential of including role models.

2 | Literature Review and Development of Hypotheses

2.1 | Literature Review

Due to its importance for sustainable development, the research field of *sustainable entrepreneurship* receives growing research attention (e.g., Ebabu et al. 2025; Ike 2025; Johnson and Schaltegger 2020; Shabbir 2023). Sustainable entrepreneurship follows the underlying logic of creating more than purely economic success, through seeking competitive advantage in balancing economic, social, and environmental aspects (Schaltegger and Wagner 2011). Accordingly, sustainable entrepreneurs seek to recognize new business opportunities, new business models, products, processes, or methods of production that contribute to the "preservation of nature, life support, and community" (Shepherd and Patzelt 2011, 137). Thus, sustainable entrepreneurs act as change agents who can be a major driver for change towards sustainable development (Buhr et al. 2023; Dean and McMullen 2007; Hesselbarth and Schaltegger 2014).

To recognize sustainability also as a competitive advantage or business opportunity, entrepreneurs need a variety of competences, which can be labelled as *sustainable entrepreneurial competences* (Buysse and Verbeke 2003; Diepolder et al. 2021; Dunphy et al. 2007; Lans et al. 2014; Ploum et al. 2018). Sustainable entrepreneurial competences can be defined as problem-solving and task-completion skills in real-life situations at the level of individual sustainable entrepreneurs (cf. Barth et al. 2007; Dale and Newman 2005). They consist of skills, knowledge, attitudes, and abilities that contribute to the likelihood of success (cf. Boyatzis and Saatcioglu 2008; Mulder 2014; Wesselink et al. 2015). Lans et al. (2014) argue that equipping individuals with such competences is the main objective of sustainable entrepreneurship education.

To systemize competences for sustainable development, Diepolder et al. (2021) conducted a literature review on key competence frameworks for sustainable entrepreneurship. They identified three frameworks, of which only Lans et al.'s (2014) framework for sustainable entrepreneurship has been empirically validated (see Ploum et al. 2018). It provides a comprehensive set of sustainable entrepreneurship competences, which are applicable in different contexts and studies. The authors aimed at creating an integrative overview that combines entrepreneurial and sustainability competences.

The seven competences of sustainable entrepreneurship developed by Lans et al. (2014) are systems-thinking competence, embracing diversity and interdisciplinarity, foresighted thinking, normative competence, action competence, interpersonal competence, and strategic management competence. S*ystems-thinking competence* describes the ability to identify and analyze relevant systems and disciplines, which are related to sustainable development. It additionally underlines the ability to understand and reflect upon interdependencies and interconnectedness of these systems. *Embracing diversity and interdisciplinarity* is the ability to facilitate and to understand learning across different groups of stakeholders. Key elements are the ability to understand relations and to identify issues

as well as the legitimacy of viewpoints in business-related decision-making processes. *Foresighted thinking* is closely related to creativity, innovation, and opportunity recognition. It focuses on being able to collectively analyze, evaluate and develop scenarios of consequences to specific decisions. *Normative competence* describes the ability to assess, map and apply sustainability values, beliefs and targets and aims to improve unsustainable states of systems. Through *action competence*, it is made explicit that sustainable development requires not only passive, but also active support from society. Thus, action competence focuses on the active involvement of individuals to promote sustainability. *Interpersonal competence* highlights the ability to successfully communicate, discuss and share empathy with the aim of facilitating participatory and collaborate activities. Lastly, *strategic management competence* focuses on the ability to collectively plan and implement projects that support sustainability transitions via organizational skills such as managing, leading and controlling action plans.

Additionally to these seven competences, which are specific for sustainable entrepreneurship, Lans et al. (2014) argue that sustainable entrepreneurs also require conventional entrepreneurship competences, such as entrepreneurial self-efficacy. *Entrepreneurial self-efficacy* is shaped by an individual's belief in their own entrepreneurial competence and has been shown to be one of the strongest predictors of entrepreneurial success (Rauch and Frese 2007). Thus, Lans et al. (2014) recommend including entrepreneurial self-efficacy as an additional competence when surveying sustainable entrepreneurship competences, as entrepreneurial self-efficacy can serve as a proxy for further conventional entrepreneurship competences.

To actively contribute to sustainable development through sustainable entrepreneurship, individuals also require the intention to become active in entrepreneurship. *Entrepreneurial intention* can be defined as the desire to become self-employed (Kolvereid 1996a, 1996b) or to start a business (Bird 1992; Krueger et al. 2000). It is regarded as a key element to enhance entrepreneurial action (Khan et al. 2022). Indeed, numerous studies confirm that entrepreneurial intention is a key determinant of entrepreneurial action (e.g., Fini et al. 2012; Ip 2024; Joensuu-Salo et al. 2022), also in the realm of sustainable entrepreneurship (Vuorio et al. 2018).

2.2 | Target Groups for Sustainable Entrepreneurship Education

Interventions to foster sustainable entrepreneurship competences are frequently directed towards entrepreneurially-oriented individuals (e.g., Agu et al. 2021; Gast et al. 2017; Kuckertz and Wagner 2010). However, Kuckertz and Wagner (2010) argue for the importance of addressing specific target groups that are particularly concerned about sustainability. Environmentalists are thus a promising alternative target group, which can complement the currently dominant approach of educating entrepreneurial individuals regarding sustainability, as environmentalists already possess crucial competences regarding sustainability but lack entrepreneurial competences. Environmentalists care about protecting the environment and are typically engaging in activities that reflect their pro-environmental attitudes, such as acknowledging human-caused climate change and avoiding environmentally harmful lifestyles (Taube et al. 2021; Tesch and Kempton 2004). Environmentalists demonstrate strong action tendencies (Bruyere and Rappe 2007) to achieve sustainability goals, for instance, through grassroots activism affiliated with specific NGOs. Indeed, Bamberg and Möser (2007) highlight in a meta-analysis that environmental attitudes can be a predictor of environmentally proactive behavior. Research also showed that individuals' environmental attitudes not only promote whether they adopt a specific behavior but also how thoroughly they engage in respective learning and how much knowledge they retain regarding environmental issues (see e.g., Arbuthnot 1977; Frick et al. 2004; Roczen et al. 2014). Given this supportive role of environmental attitudes in knowledge acquisition and learning, we argue that environmentalists form a particularly relevant target group for sustainable entrepreneurship education. Specifically, we expect to find that among participants of sustainable entrepreneurship interventions, environmentalists show particularly strong increases in respective competences.

H1. *Among participants of sustainable entrepreneurship interventions, environmentalists display stronger increases in sustainable entrepreneurial competences than non-environmentalists.*

2.3 | The Impact of Role Models in Sustainable Entrepreneurship Education Interventions

Previous research on sustainable entrepreneurship has argued that nascent entrepreneurs could benefit from contact with entrepreneurial role models (e.g., Diepolder et al. 2024; Vuorio et al. 2018). Role models can positively influence the motivation of role aspirants as well as their goals by serving as behavioral models, showing what is realistically feasible and serving as an inspiration (Morgenroth et al. 2015). In sustainable entrepreneurship education, it is argued that contact with role models can have a positive effect on promoting sustainable entrepreneurship among students (Bernhardt et al. 2017; Diepolder et al. 2024). Interaction and sparring with authentic role models hold the potential to serve as inspiration for own start-ups and can additionally help to minimize the barrier for taking own entrepreneurial action. Furthermore, role models can offer useful advice on how to overcome challenges that are unique to sustainable entrepreneurship (Bernhardt et al. 2017). If the role models are sustainable entrepreneurs, they can also introduce impressions or new mindsets (Cavallaro et al. 2017) and can share their insights about real-world relevance (Bernhardt et al. 2017; Diepolder et al. 2024). Accordingly, role models are a popular pedagogical instrument in education for sustainable development (Fellnhofer 2017; Stern et al. 2018). To validate these positive expectations towards role models in the context of sustainable entrepreneurship, Diepolder et al. (2024) empirically compared educational settings with and without role models and found that those students being immersed in role models scored higher on both innovativeness and usefulness of the entrepreneurial ideas they created. Similarly, Vuorio et al. (2018) suggest that using role models in higher education for sustainable entrepreneurship can lead to positive experiences.

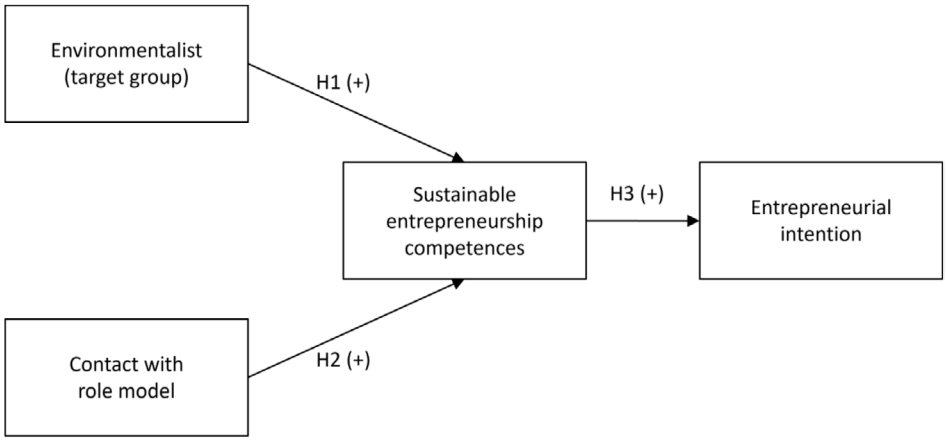

FIGURE 1 | Summary of hypotheses.

These findings of previous research suggest that contact with sustainable entrepreneurship role models can enhance individuals' sustainable entrepreneurial competences. Accordingly, this paper aims to determine whether increases in sustainable entrepreneurial competences are greater for education interventions that integrate sustainable entrepreneurs as role models than for interventions without role models. To summarize, we expect an increase in sustainable entrepreneurial competences following contact with sustainable entrepreneurs. They can support the process of identifying innovative ideas, recognizing business opportunities, and overcoming challenges specific to a sustainable entrepreneurial context.

H2. *Participants in interventions that include direct contact with sustainable entrepreneurial role models show stronger increases in sustainable entrepreneurial competences compared to participants in interventions without role models.*

2.4 | The Impact of Sustainable Entrepreneurial Competences on Entrepreneurial Intentions

While fostering sustainable entrepreneurial competences is key for sustainable entrepreneurship education, sustainable entrepreneurship education goes beyond solely fostering competences. Instead, it also aims at creating respective intentions. Entrepreneurial intention is defined as an individual's stated commitment to consciously plan starting a business (Krueger and Carsrud 1993; Thompson 2009). Khan et al. (2022) even highlighted entrepreneurial intention as a prerequisite for enhancing entrepreneurial action. Compared to educating entrepreneurial individuals, increasing entrepreneurial intention is particularly challenging among environmentalists, as their entrepreneurial intention is typically lower. For example, St-Jean and Labelle (2018) show that an individual's degree of sustainability orientation has a negative effect on their entrepreneurial action. This could be explained by the fact that environmentalism is related to self-transcendence values, whereas entrepreneurship frequently relates to self-enhancement values (cf. González-Rodríguez et al. 2015; Kruse et al. 2019). Unlike values, however, entrepreneurial intention is not a stable factor but can be formed by contextual factors (Barba-Sánchez et al. 2022). One of the most prominent models to explain the formation of entrepreneurial intentions is the Shapero-Krueger model (Krueger et al. 2000; Sánchez 2011). In this model, the perceived feasibility of entrepreneurial action is regarded as a key barrier towards entrepreneurial intentions (Krueger et al. 2000). Krueger et al. (2000) define perceived feasibility as an individual's perception of having the necessary competences to start a new business. Hence, perceived feasibility can be regarded as an individual's self-assessment of his or her own competences. In line with the Shapero-Krueger model, Joensuu-Salo et al. (2022) find that sustainable entrepreneurial competences increase entrepreneurial intention. Likewise, Kuckertz and Wagner (2010) observe that students are likely to develop sustainable entrepreneurial intentions if confronted with sustainability-related challenges.

Based on these empirical findings, we argue that entrepreneurial intentions can be shaped by increasing the respective competences of individuals. Thus, we expect that higher levels of sustainable entrepreneurial competences are associated with higher levels of entrepreneurial intention:

H3. *Individuals with higher levels of sustainable entrepreneurial competences show higher levels of entrepreneurial intention.*

Figure 1 provides a summary of all hypotheses.

3 | Materials and Methods

3.1 | Procedure

To test the hypotheses, we designed and conducted 14 educational interventions in Germany. They were conducted from October 2022 to January 2025 and aimed at increasing the sustainable entrepreneurial competences of the participants. The formats of interventions conducted included short-term interventions that lasted one or 2 days—such as field trips to sustainability-oriented companies and startups, workshops for members of environmental organizations, talks by sustainable entrepreneurs, and summer camps—as well as long-term interventions, such as lectures and seminars, which took place over one semester (ca. 4 months).

The educational interventions addressed both environmentalists, that is, individuals that actively demonstrate

environmental behavior through enrolling in environmental studies programs or affiliation with environmental groups, and non-environmentalists, that is, individuals that do not actively engage in such behavior. The interventions included both curricular and extra-curricular activities.

Some of the interventions integrated role models, that is, actively operating sustainable entrepreneurs. These individuals shared their journey from the idea to the founding and development of their sustainable venture with the participants.

To test the effectiveness of the interventions, we set up a pretest–posttest design, in which participants filled in a survey before the intervention and a follow-up survey after the intervention. The questionnaire was pretested with 10 students to ensure that the items were clear, meaningful, and relevant. Overall, we collected 148 complete pre- and post-responses. Table 1 provides an overview of the participants and the interventions they participated in.

3.2 | Measurement of Variables

Regarding the target group, we differentiated interventions which addressed environmentalists (i.e., members of environmental interest groups, students of environmental and sustainability studies: target group = 1) and those which addressed other audiences (target group = 0). To capture the effect of role models, we distinguished interventions which included contact with a founder of a sustainable venture (role model = 1) from interventions without such contact (role model = 0).

TABLE 1 | Overview of participants and interventions.

Characteristic of participants	Share	Mean
Age (in years)		24.97
Gender (female)	62.2%	
Occupation	100.0%	
Students in Business/Management/ Economics	26.4%	
Students in other subjects	63.8%	
Non-students	6.8%	
Missing values	2.0%	
Characteristic of interventions	**Share of participants in such interventions**	
Contact with role model	23.0%	
Duration (entire semester)	20.9%	
Environmentalist target group	16.9%	
Type of intervention	100.0%	
Field trip	8.8%	
Workshops	6.1%	
Talks by sustainable entrepreneurs	12.3%	
Summer camps	7.4%	
Lectures	45.3%	
Seminars	20.3%	

The mediator variable sustainable entrepreneurship competences was measured as proposed by Lans et al. (2014). The authors differentiate the following seven competences for sustainable entrepreneurship, which are complemented by an eighth meta-competence: (1) system thinking competence, (2) embracing diversity and interdisciplinarity, (3) foresighted thinking, (4) normative competence, (5) action competence, (6) interpersonal competence, (7) strategic management competence, plus the meta-competence (8) entrepreneurial self-efficacy. Together, these competences constitute the eight factors included in the total sustainable entrepreneurship competence construct in this research. Each factor was measured by three to five items. Sample items include, for example, 'I am very good at identifying opportunities for sustainable development' (action competence), 'I am able to bring together economic, social, and environmental conflicts of interest' (embracing diversity and interdisciplinarity), or 'I am able to analyze strengths and weaknesses of production chains and propose improvements to reduce the negative effects on the environment or society' (strategic thinking competence).

Overall, the sustainable entrepreneurship competence construct by Lans et al. (2014) consists of 32 items, each rated on a five-point numerical rating scale, ranging from '1 – I strongly agree' to '5 – I strongly disagree'. The reliability of the construct was confirmed with Cronbach's alpha of 0.938 for pre-data and 0.954 for post-data. Additionally, we conducted a confirmatory factor analysis. According to the criteria by Hu and Bentler (1999), the results are all within the cut-off range ($Chi^2/df = 1.68$, GFI = 0.95, RMSEA = 0.07, SRMR = 0.07), with the only exception of the CFI (0.83), which is still in the permissible range.

The dependent variable 'entrepreneurial intention' was measured as suggested by (Weber 2012; based on Shapero and Sokol 1982) using the item 'I intend to start my own business in the next five to ten years.' Like the items on the sustainable entrepreneurship competences, this item was rated on a five-point numerical rating scale, ranging from '1 – I strongly agree' to '5 – I strongly disagree.' Using single items for measuring entrepreneurial intention is frequent also in research building on the Global Entrepreneurship Monitor (e.g., Calza et al. 2020; Jeon 2018; Thornton and Klyver 2019; Wyrwich et al. 2016).

Lastly, we controlled for gender, age, and duration of the intervention: First, as earlier analyses show that gender may significantly impact environmental entrepreneurial activity (e.g., Dickel and Eckardt 2021; Hechavarría 2016; Tenner and Hörisch 2021), we controlled for the gender of respondents (1 = female; 0 = male).[1] Second, the participant's age was included as a control variable, as multiple studies showed an effect of age on socially and environmentally oriented entrepreneurial activity (e.g., Dickel et al. 2021; Hörisch et al. 2017). Third, we controlled for the duration of the interventions, as it can be expected that interventions with longer durations exert a stronger positive effect on the increase in competences. We differentiated interventions that lasted one or two days

TABLE 2 | Descriptive statistics and correlations.

Research variable	1	2	3	4	5	6	7	8	9
1. Entrepreneurial intention t_1	1.000								
2. Entrepreneurial intention t_0	0.851**	1.000							
3. Sustainable entrepr. competences t_1	0.465**	0.392**	1.000						
4. Sustainable entrepr. competences t_0	0.375**	0.345**	0.793**	1.000					
5. Environmentalist (1 = yes, 0 = no)	0.042	0.008	0.229**	0.100	1.000				
6. Role model (1 = yes, 0 = no)	0.073	0.053	0.311**	0.287**	0.440**	1.000			
7. Gender (1 = female, 0 = male)	−0.203*	−0.247**	−0.034	0.010	0.091	0.029	1.000		
8. Age	0.111	0.086	0.252**	0.335**	−0.044	0.244**	−0.195*	1.000	
9. Duration (1 = semester, 0 = 1–2 days)	−0.073	0.054	0.093	−0.165*	−0.010	−0.084	−0.146	−0.055	1.000
Mean	2.858	2.655	3.600	3.402	0.169	0.230	0.622	24.973	0.209
S.D.	1.512	1.432	0.578	0.555	0.376	0.422	0.487	7.069	0.408

Note: $n = 148$.
*$p < 0.05$ (two-tailed correlations).
**$p < 0.01$.

(duration = 0) from interventions that lasted for one semester (ca. four months) (duration = 1). Finally, we included the pretest data on sustainable entrepreneurial competences and entrepreneurial intention, that is, the values prior to the intervention, as control variables.

4 | Results and Discussion

4.1 | Descriptive Statistics and Correlations

Overall, we collected 148 responses from participants who fully completed both surveys (prior to and after the intervention). The average age of participants was 25.0 years, and 62.2% were female. The descriptive statistics and correlations of all variables are summarized in Table 2.

The correlations show values of max. 0.465, thus far below the critical threshold of 0.8 which signals potential problems related to multicollinearity (Kennedy 1992). Exceptions of higher values (up to 0.851) only include the correlations among the same variables before and after the intervention, which is as expected.

4.2 | Hypotheses Tests

To test the hypotheses, a mediated regression analysis was carried out using the PROCESS macro (bootstrapping, 10,000 samples; Hayes 2013). The independent variables were mean centered prior to the analysis. In general, mediation analysis investigates how an independent variable affects a dependent variable through one or more intervening 'mediator' variables (Baron and Kenny 1986). Various methods exist to test mediator models, for example, the Sobel test or bootstrapping. Bootstrapping is a nonparametric statistical method that involves repeatedly sampling from the data set to estimate the indirect effect and provides a more robust alternative to methods like the Sobel test for mediation analysis (Preacher and Hayes 2008). The results of the bootstrapping procedure are shown in Table 3.

Model 1 depicts the effect on the mediator variable sustainable entrepreneurship competences after the intervention and shows a high model fit ($R^2 = 0.715$). The bootstrapping procedure supported that interventions with the target group environmentalists show significantly higher competences than interventions with non-environmentalists ($b = 0.203$, $p < 0.01$). Thus, H1 is supported: The results support that interventions among environmentalists can spur sustainable entrepreneurial competences more effectively than interventions among other target groups. However, the results did not show a significant effect of role models on competences ($b = 0.065$, n.s.), so that H2 cannot be supported in this analysis (Table 3). Regarding the control variables, the effect on sustainable entrepreneurship competences is significantly higher for longer interventions ($b = 0.310$, $p < 0.01$). Moreover, both prior competences ($b = 0.797$, $p < 0.01$) and prior entrepreneurial intention ($b = 0.046$, $p < 0.05$) exert a significant positive effect on post-competences.

Model 2 displays the effect on the dependent variable entrepreneurial intention after the intervention ($R^2 = 0.772$). Results confirm a positive effect of post-intervention sustainable entrepreneurship competences on post-intervention entrepreneurial intention ($b = 0.821$, $p < 0.01$), giving support for H3. This means that higher levels of sustainable entrepreneurial competences are linked to higher levels of entrepreneurial intention. With respect to the control variables, a significant negative effect of prior competences ($b = -0.468$, $p < 0.05$) and a positive effect

TABLE 3 | Results of mediated regression analysis.

	Model 1		Model 2	
	Sust. entrepr. competences t_1		Entrepreneurial intention t_1	
DV	***b***	**SE**	***b***	**SE**
Constant	0.664**	0.184	−0.616†	0.451
Gender (1 = female)	0.005	0.058	−0.051	0.136
Age	−0.001	0.004	0.004	0.010
Duration (1 = semester)	0.310**	0.066	−0.659**	0.166
Pre-sust. entrepr. competences t_0	0.797**	0.056	−0.468*	0.205
Pre-entrepreneurial intention t_0	0.046*	0.020	0.837**	0.049
Environmentalist (1 = yes)	0.203**	0.079	−0.010	0.189
Role model (1 = yes)	0.065	0.074	−0.126	0.173
Post-sust. entrepr. competences t_1			0.821**	0.198
R^2	0.715		0.772	
F value	50.062**		58.768**	

Note: $n = 148$; unstandardized coefficients.
*$p < 0.05$.
**$p < 0.01$.
†$p < 0.10$ (one-tailed test of coefficients).

of prior entrepreneurial intention ($b = 0.837$, $p < 0.01$) on post-intervention intention are found.

Contrary to our expectations, a longer duration of the intervention was linked to lower intentions ($b = -0.659$, $p < 0.01$)—but positively associated with competences as shown above. Longer interventions may provide participants with a more comprehensive understanding of the complexities involved with sustainable venturing. While longer interventions may thus enhance competences, they may concurrently lead to a more critical evaluation of the feasibility or desirability of pursuing entrepreneurial paths, thereby possibly lowering intentions. We recommend future research to better understand the underlying mechanisms driving these effects of duration on competences and intentions.

Results further support that the effect of the environmentalist variable on entrepreneurial intention is mediated by sustainable entrepreneurship competences. The confidence interval (CI) of the indirect effect (IE) does not include zero (IE = 0.167, CI = 0.037 to 0.362), confirming a significant mediation effect (Rucker et al. 2011). However, the analysis did not confirm a mediation effect of the relationship between role model via competences on entrepreneurial intention (CI includes 0).

In all models, the highest variation factor (VIF) was 3.503 and the highest condition index (CI) was 4.435. These values are far below the proposed upper limits for a VIF of 10 (Kennedy 1992) and for a CI of 30 (Grewal et al. 2004), indicating that the risk of multicollinearity is low in our study. However, since the correlation coefficients of the pretest variables, that is, the sustainable entrepreneurship competences and entrepreneurial intention prior to the intervention were close to and above 0.80, we cannot rule out that multicollinearity exists and thus ran a robustness check.

TABLE 4 | Results of mediated regression analysis (robustness check).

	Model 1		Model 2	
	Sust. entrepr. competences t_1		Entrepreneurial intention t_1	
DV	***b***	**SE**	***b***	**SE**
Constant	3.010**	0.195	−1.081†	0.775
Gender (1 = female)	0.009	0.095	−0.668**	0.230
Age	0.018**	0.007	−0.012	0.017
Duration (1 = semester)	0.177†	0.111	−0.597*	0.271
Environmentalist (1 = yes)	0.231*	0.134	−0.119	0.328
Role model (1 = yes)	0.277*	0.123	−0.246	0.304
Post-sust. entrepr. competences t_1			1.345**	0.204
R^2	0.164		0.282	
F value	5.561**		9.251**	

Note: $n = 148$; unstandardized coefficients.
*$p < 0.05$.
**$p < 0.01$.
†$p < 0.10$ (one-tailed test of coefficients).

4.3 | Robustness Check

To check for the robustness of the results, we conducted another mediated regression analysis without the pretest variables (see Table 4). Although the model fit of Model 1 is much lower than in the previous analysis ($R^2 = 0.164$), results also show a positive effect of interventions with the target group environmentalists on competences ($b = 0.231$, $p < 0.05$). Thus, H1 is again supported, confirming that among participants of sustainable entrepreneurship interventions, environmentalists display stronger increases in sustainable entrepreneurial competences than non-environmentalists.

In contrast to the main analysis, the robustness check shows a significant positive effect of role models on competences ($b = 0.277$, $p < 0.05$), which is in line with H2. To check if the significant effect of role models on competences was masked in the main analysis due to multicollinearity, we further ran a residualized change score analysis. The result confirms a significant positive effect of role models on the residualized change score ($b = 0.312$, $p < 0.01$), suggesting that the non-significant effect in the main analysis (Table 3) may indeed have been masked due to multicollinearity between pretest

TABLE 5 | Results of paired t-test.

	Mean t_0 (pre-intervention)	Mean t_1 (post-intervention)	Delta t_1-t_0	*p*
System thinking competence	3.35	3.59	0.24	<0.01
Embracing diversity and interdisciplinarity	3.39	3.53	0.14	<0.01
Foresighted thinking	3.54	3.77	0.23	<0.01
Normative competence	3.56	3.81	0.25	<0.01
Action competence	3.36	3.56	0.20	<0.01
Interpersonal competence	3.83	3.89	0.06	n.s.
Strategic management competence	3.05	3.36	0.30	<0.01
Entrepreneurial self-efficacy	3.14	3.30	0.15	<0.01
Sustainable entrepr. competences	3.40	3.60	0.20	<0.01
Entrepreneurial intention	2.66	2.86	0.20	<0.01

Note: $n = 148$, paired *t*-test (two-tailed).

and posttest variables. Thus the final evaluation of H2 is ambiguous, with the robustness check and the residualized change score analysis lending support for H2 and offering a possible explanation for the non-significant effect in the main analysis. Regarding the control variables, the effect on sustainable entrepreneurship competences is significantly higher for older participants ($b = 0.018$, $p < 0.01$) and longer interventions ($b = 0.177$, $p < 0.10$).

Model 2 of the reran bootstrapping procedure indicates a medium model fit ($R^2 = 0.282$) and also confirms a positive effect of post-intervention sustainable entrepreneurship competences on post-intervention entrepreneurial intention ($b = 1.345$, $p < 0.01$), supporting H3. Regarding the control variables, results further show that post-intervention entrepreneurial intentions were significantly lower for female participants ($b = -0.668$, $p < 0.01$) and longer interventions ($b = -0.597$, $p < 0.05$).

The results also confirm that sustainable entrepreneurship competences significantly mediate both the relationship between the environmentalist variable and entrepreneurial intention (IE = 0.311, CI = 0.023 to 0.604) and the relationship between role model contact and entrepreneurial intention (IE = 0.373, CI = 0.116 to 0.663). The confidence intervals of the respective indirect effect do not include zero (cf. Rucker et al. 2011).

As expected, multicollinearity indicators were slightly lower than in the main analysis, with a maximum VIF of 1.415 and the highest CI of 3.984, so that in combination with a maximum correlation coefficient of 0.465, the risk of multicollinearity is low.

4.4 | Post Hoc Analysis

Since sustainable entrepreneurship competence consists of eight subdimensions, we further conducted a paired t-test to identify which competences increased to a strong or low degree during the interventions. As shown in Table 5, participants significantly increased their competences across seven of the eight dimensions. Strategic management competence (0.30), normative competence (0.25), system thinking competence (0.24), and foresighted thinking (0.23) had the strongest positive change (all $p < 0.01$). The analysis further supports that the interventions significantly increased the participants' total sustainable entrepreneurship competences (0.20, $p < 0.01$) and entrepreneurial intention (0.20; $p < 0.01$).

4.5 | Educational Interventions and Their Effect on Competences for Sustainable Entrepreneurship

Our research shows that educational interventions can significantly increase competences for sustainable entrepreneurship across various dimensions as well as entrepreneurial intention. These findings thus support earlier research which underscores the importance of education in training future sustainable entrepreneurs (cf. Cope 2005; Corbett 2005; Wals and Jickling 2002).

Specifically, we highlight a promising new target group for sustainable entrepreneurship education. While so far, most education interventions were targeted towards business students (e.g., Agu et al. 2021; Gast et al. 2017; Kuckertz and Wagner 2010), the results show that the increase in competences was particularly strong among environmentalists. Hence, this research shows that environmentalists are a very auspicious and yet largely neglected target group for sustainable entrepreneurship education. By revealing the potential of environmentalists as a promising target group for sustainable entrepreneurship education, our results specify the argumentation by Kuckertz and Wagner (2010) that sustainable entrepreneurship education should also target other groups besides business students.

Concerning the effect of involving role models in sustainable entrepreneurship education, the results are less clear cut. H2

was not supported in the main analysis. However, in contrast to the main analysis, the bootstrapping analysis without the pretest variables as well as the residualized change score analysis indicated that participants in interventions involving contact with sustainable entrepreneurial role models show significantly higher levels of sustainable entrepreneurial competences than participants in interventions not involving role models. This finding of the robustness check and the residualized change score analysis is not only in line with H2, but also with previous research, which highlighted the importance of role models in environmental education in general (Stern et al. 2018) and sustainable entrepreneurship in particular (Bernhardt et al. 2017; Diepolder et al. 2024; Fellnhofer 2017). A potential reason for the non-significant effect in the main analysis is that the correlation coefficients of the pretest and posttest competence and intention variables are relatively high. Thus, the nonsignificant effect in the main analysis is likely due to statistical reasons as shown by the residualized change score analysis. These ambiguous results on the effect of role models partly correspond to research that did not find a significant link between role models and sustainable entrepreneurial intention, attitude, and behavioral control (Diepolder et al. 2025). These findings call for more research regarding role models, potentially also investigating factors which moderate the effect of role models on sustainable entrepreneurial competences and intentions, such as the similarity of the participants to the role model.

Finally, our findings show a positive effect of sustainable entrepreneurial competences on entrepreneurial intentions. We thus confirm previous research which argues that entrepreneurial intention can be formed (Barba-Sánchez et al. 2022). Specifically, within the context of sustainable entrepreneurship, we validate the assumption of the Shapero–Krueger model (Krueger et al. 2000; Sánchez 2011). It states that the perceived feasibility of entrepreneurial action, measured as an individual's perception of having the necessary competences to start a new business, is a key enabler of entrepreneurial intentions (Krueger et al. 2000). Our findings are also consistent with Joensuu-Salo et al. (2022), who found that sustainable entrepreneurial competences positively shape entrepreneurial intention. This insight highlights that increasing sustainable entrepreneurial competences is highly rewarding. First, it increases individuals' ability to perform sustainable entrepreneurial action. Second, it augments individuals' intention to become active entrepreneurs. Thus, we find further support for the assumption by Lans et al. (2014) that equipping individuals with sustainable entrepreneurial competences should be the main objective of sustainable entrepreneurship education.

5 | Conclusion

This paper shows that environmentalists can be a promising target group for sustainable entrepreneurship interventions, both in terms of effectively enhancing competences and entrepreneurial intentions. Specifically, choosing this target group can help design more effective interventions. The insights of this study provide multiple implications for research and practice.

5.1 | Research Implications and Limitations

With regard to research implications, first, we confirm the value and applicability of the sustainable entrepreneurship competences framework by Lans et al. (2014). Not only does the study confirm the reliability of the measurement scale, it also demonstrates its applicability in the context of environmentalists. Second, the insight that interventions among environmentalists were more effective than interventions among other target groups suggests exploring further how the (disciplinary) background shapes the effectiveness of sustainable entrepreneurship education. Specifically, further research could compare different subgroups beyond environmentalists, such as environmental engineering students, environmental management students, or non-specialist groups, to assess whether similar interventions would yield comparable results across domains (cf. Kuckertz and Wagner 2010). Third, this research discusses role models as a relevant factor for the development of sustainable entrepreneurship competences. The findings indicate that role model contact can be a critical factor in sustainable entrepreneurship education. Given the ambiguous results on the impact of role models on sustainable entrepreneurship competences and intentions, future research could explore the underlying mechanisms (e.g., based on social learning theory) that might explain under which circumstances role models are more effective (or less effective) in this regard. Questions of interest include whether the similarity of the role model to the participants, for example, with regard to gender, educational background, or sector matter in improving competences.

Future studies should also address the limitations of this research. While this study was conducted in Germany, we call for replicating the findings in other national contexts to explore whether the same interventions work similarly across different cultures (cf. Bogatyreva et al. 2019). Furthermore, this research only tested the short-term effects of interventions and only the effects of interventions targeting individuals. However, Srivastava et al. (2024) highlight the importance of collective effort through social movements instead of primarily focusing on interventions at the individual level. Thus, future research could explore the role of collective effort and vary the unit of analysis in interventions (e.g., interventions among individuals vs. interventions tailored towards existing teams (e.g., entrepreneurial teams or teams within environmental organizations)). Likewise, future research could track participants over a longer period to determine the long-term effects of educational interventions. Specifically, longitudinal studies could be conducted to assess the long-term impact of role models not only on sustainable entrepreneurial competences and intentions, but also on sustainable entrepreneurial success. This would also address the limitation that this research is based on self-reported competences and a single-item measure of entrepreneurial intention but does not study the actual behavior of starting-up companies. Building on St-Jean and Labelle (2018), future research could analyze how sustainable entrepreneurial intention translates into respective behavior and which role target groups and sustainability orientation play in this regard.

5.2 | Practical Implications

Concerning the practical implications, the results of this research show the importance of designing targeted interventions, instead of searching for a 'one-size fits all' approach. Most importantly, interventions focusing on sustainable entrepreneurship competences can benefit from being tailored to specific target groups, such as environmentalists. Indeed, environmentalists are a very promising, but frequently overlooked target group for sustainable entrepreneurship education. Purposefully targeting environmentalists may allow for more effective use of resources by directly addressing the needs and motivations of those individuals, which show the highest levels of receptiveness for sustainable entrepreneurship interventions. Specifically, given the significant increase in sustainable entrepreneurship competences observed among interventions targeting environmentalists, our study shows the benefits of integrating entrepreneurship-related contents into sustainability and environmental sciences programs. This can help equip environmentalists with the necessary knowledge and skills to implement their environmental and social ideas through entrepreneurial endeavors.

Additionally, this research informs decisions on involving role models in sustainable entrepreneurship education. We show that incorporating contact with experienced sustainable entrepreneurs can potentially enhance the development of sustainable entrepreneurship competences (cf. Bernhardt et al. 2017; Diepolder et al. 2024; Fellnhofer 2017), although this effect is less robust than the effect of addressing different target groups.

Lastly, the results of our analysis emphasize the benefit of designing sustainable entrepreneurship education with the aim to increase competences (cf. Álvarez-García et al. 2022; Lans et al. 2014). We demonstrate that increasing sustainable entrepreneurial competences may not only be rewarding in itself, as it improves participants' problem-solving and task completion skills (cf. Barth et al. 2007; Dale and Newman 2005), but that higher sustainable entrepreneurial competences are also linked to higher entrepreneurial intentions.

Overall, this research shows that specifically targeting educational interventions and including role models can be effective elements in sustainable entrepreneurship education. Such interventions not only foster specific competences of participants but can also stimulate their entrepreneurial intentions. Above all, educational interventions for sustainable entrepreneurship can be an effective means to attract new target groups for sustainable entrepreneurship if they also target environmentalists as a distinct and promising target group.

Acknowledgments

We are grateful for the financial support of the German Federal Environmental Foundation (Grant number: 37741/01-44). We would like to thank the anonymous reviewers and the editor for their very constructive and valuable feedback on our manuscript. Open Access funding enabled and organized by Projekt DEAL.

Conflicts of Interest

The authors declare no conflicts of interest.

Endnotes

[1] No participant chose a third gender option labeled as 'diverse'.

References

Agu, A. G., O. O. Kalu, C. O. Esi-Ubani, and P. C. Agu. 2021. "Drivers of Sustainable Entrepreneurial Intentions Among University Students: An Integrated Model From a Developing World Context." *International Journal of Sustainability in Higher Education* 22, no. 3: 659–680.

Álvarez-García, J., E. Hormiga-Pérez, P. O. Sarango-Lalangui, and M. La Río-Rama. 2022. "Leaders' Sustainability Competences and Small and Medium-Sized Enterprises Outcomes: The Role of Social Entrepreneurial Orientation." *Sustainable Development* 30, no. 5: 927–943.

Arbuthnot, J. 1977. "The Roles of Attitudinal and Personality Variables in the Prediction of Environmental Behavior and Knowledge." *Environment and Behavior* 9, no. 2: 217–232.

Bamberg, S., and G. Möser. 2007. "Twenty Years After Hines, Hungerford, and Tomera: A New Meta-Analysis of Psycho-Social Determinants of Pro-Environmental Behaviour." *Journal of Environmental Psychology* 27, no. 1: 14–25.

Barba-Sánchez, V., M. Mitre-Aranda, and J. Del Brío-González. 2022. "The Entrepreneurial Intention of University Students: An Environmental Perspective." *European Research on Management and Business Economics* 28, no. 2: 100184.

Baron, R. M., and D. A. Kenny. 1986. "The Moderator–Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations." *Journal of Personality and Social Psychology* 51, no. 6: 1173.

Barth, M., J. Godemann, M. Rieckmann, and U. Stoltenberg. 2007. "Developing Key Competences for Sustainable Development in Higher Education." *International Journal of Sustainability in Higher Education* 8, no. 4: 416–430.

Bernhardt, J., G. Schaad, J. Boman, M. Ambros, J. Činčera, and P. Biberhofer. 2017. "Joint CASE Report on Cooperation Between Higher Education Institutions and Companies and Evaluation of Regional Pilots."

Bird, B. J. 1992. "The Operation of Intentions in Time: The Emergence of the New Venture." *Entrepreneurship Theory and Practice* 17, no. 1: 11–20.

Bogatyreva, K., L. Edelman, T. Manolova, O. Osiyevskyy, and G. Shirokova. 2019. "When Do Entrepreneurial Intentions Lead to Actions? The Role of National Culture." *Journal of Business Research* 96: 309–321.

Boyatzis, R. E., and A. Saatcioglu. 2008. "A 20-Year View of Trying to Develop Emotional, Social and Cognitive Intelligence Competencies in Graduate Management Education." *Journal of Management Development* 27, no. 1: 92–108.

Bruyere, B., and S. Rappe. 2007. "Identifying the Motivations of Environmental Volunteers." *Journal of Environmental Planning and Management* 50, no. 4: 503–516.

Buhr, M., D. Harms, and S. Schaltegger. 2023. "Individual Change Agents for Corporate Sustainability Transformation: A Systematic Literature Review." *Benchmarking: An International Journal* 30, no. 10: 4221–4247.

Buysse, K., and A. Verbeke. 2003. "Proactive Environmental Strategies: A Stakeholder Management Perspective." *Strategic Management Journal* 24, no. 5: 453–470.

Calza, F., C. Cannavale, and I. Z. Nadali. 2020. "How Do Cultural Values Influence Entrepreneurial Behavior of Nations? A Behavioral Reasoning Approach." *International Business Review* 29, no. 5: 101725.

Cavallaro, M. C., M. Boucher, and T. A. Steelman. 2017. "Sustainability Champions: Role Models in Sustainability Graduate Education." In *Handbook of Theory and Practice of Sustainable Development in Higher Education*, edited by W. Leal Filho, M. Mifsud, C. Shiel, and R. Pretorius, 329–342. Springer International Publishing.

Cope, J. 2005. "Toward a Dynamic Learning Perspective of Entrepreneurship." *Entrepreneurship Theory and Practice* 29, no. 4: 373–397.

Corbett, A. C. 2005. "Experiential Learning Within the Process of Opportunity Identification and Exploitation." *Entrepreneurship Theory and Practice* 29, no. 4: 473–491.

Dale, A., and L. Newman. 2005. "Sustainable Development, Education and Literacy." *International Journal of Sustainability in Higher Education* 6, no. 4: 351–362.

Dean, T. J., and J. S. McMullen. 2007. "Toward a Theory of Sustainable Entrepreneurship: Reducing Environmental Degradation Through Entrepreneurial Action." *Journal of Business Venturing* 22, no. 1: 50–76.

Dickel, P., and G. Eckardt. 2021. "Who Wants to Be a Social Entrepreneur? The Role of Gender and Sustainability Orientation." *Journal of Small Business Management* 59, no. 1: 196–218.

Dickel, P., M. Sienknecht, and J. Hörisch. 2021. "The Early Bird Catches the Worm: An Empirical Analysis of Imprinting in Social Entrepreneurship." *Journal of Business Economics* 91, no. 2: 127–150.

Diepolder, C. S., J. Huwer, and H. Weitzel. 2025. "Effects of Competence-Based Sustainable Entrepreneurship Education on Secondary School Students' Sustainable Entrepreneurial Intention." *Sustainable Technology and Entrepreneurship* 4, no. 2: 100103.

Diepolder, C. S., H. Weitzel, and J. Huwer. 2021. "Competence Frameworks of Sustainable Entrepreneurship: A Systematic Review." *Sustainability* 13, no. 24: 13734.

Diepolder, C. S., H. Weitzel, and J. Huwer. 2024. "Exploring the Impact of Sustainable Entrepreneurial Role Models on Students' Opportunity Recognition for Sustainable Development in Sustainable Entrepreneurship Education." *Sustainability* 16, no. 4: 1484.

Dunphy, D., A. Griffiths, and S. Benn. 2007. *Organizational Change for Corporate Sustainability*. Routledge.

Ebabu, E. A., H. Yu, Z. Weikang, and H. Gong. 2025. *Economic and Social Impacts of Sustainable Entrepreneurship: Systematic Review and Bibliometric Study of Global Evidence*. Advance online publication.

Fellnhofer, K. 2017. "Entrepreneurship Education Revisited: Perceived Entrepreneurial Role Models Increase Perceived Behavioural Control." *International Journal of Learning and Change* 9, no. 3: 260–283.

Fini, R., R. Grimaldi, G. L. Marzocchi, and M. Sobrero. 2012. "The Determinants of Corporate Entrepreneurial Intention Within Small and Newly Established Firms." *Entrepreneurship Theory and Practice* 36, no. 2: 387–414.

Fokuhl, M., J. Hörisch, I. Behrens, M. C. Hörnstein, and U. Lehmann. 2025. "Socio-Demographic Influences on Environmental Entrepreneurship: A Systematic Review." *International Journal of Entrepreneurial Venturing* 17, no. 1: 88–116.

Frick, J., F. G. Kaiser, and M. Wilson. 2004. "Environmental Knowledge and Conservation Behavior: Exploring Prevalence and Structure in a Representative Sample." *Personality and Individual Differences* 37, no. 8: 1597–1613.

Gast, J., K. Gundolf, and B. Cesinger. 2017. "Doing Business in a Green Way: A Systematic Review of the Ecological Sustainability Entrepreneurship Literature and Future Research Directions." *Journal of Cleaner Production* 147: 44–56.

González-Rodríguez, M. R., M. C. Díaz-Fernández, and B. Simonetti. 2015. "The Social, Economic and Environmental Dimensions of Corporate Social Responsibility: The Role Played by Consumers and Potential Entrepreneurs." *International Business Review* 24, no. 5: 836–848.

Grewal, R., J. A. Cote, and H. Baumgartner. 2004. "Multicollinearity and Measurement Error in Structural Equation Models: Implications for Theory Testing." *Marketing Science* 23, no. 4: 519–529.

Hayes, A. F. 2013. *Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*. Guilford Press.

Hechavarría, D. M. 2016. "Mother Nature's Son? The Impact of Gender Socialization and Culture on Environmental Venturing." *International Journal of Gender and Entrepreneurship* 8, no. 2: 137–172.

Hesselbarth, C., and S. Schaltegger. 2014. "Educating Change Agents for Sustainability–Learnings From the First Sustainability Management Master of Business Administration." *Journal of Cleaner Production* 62: 24–36.

Hörisch, J., J. Kollat, and S. A. Brieger. 2017. "What Influences Environmental Entrepreneurship? A Multilevel Analysis of the Determinants of Entrepreneurs' Environmental Orientation." *Small Business Economics* 48, no. 1: 47–69.

Hu, L. T., and P. M. Bentler. 1999. "Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives." *Structural Equation Modeling: A Multidisciplinary Journal* 6, no. 1: 1–55.

Ike, D. 2025. *Sustainable Entrepreneurship in Emergence: A Systematic Literature Review*. Advance online publication.

Ip, C. Y. 2024. "From Green Entrepreneurial Intention to Behaviour: The Role of Environmental Knowledge, Subjective Norms, and External Institutional Support." *Sustainable Futures* 8: 100331.

Jeon, S. 2018. "What Influences Entrepreneurial Intentions? An Empirical Study Using Data From the Global Entrepreneurship Monitor." *Academy of Entrepreneurship Journal* 24, no. 3: 1–15.

Joensuu-Salo, S., A. Viljamaa, and E. Varamäki. 2022. "Sustainable Entrepreneurs of the Future: The Interplay Between Educational Context, Sustainable Entrepreneurship Competence, and Entrepreneurial Intentions." *Administrative Sciences* 12, no. 1: 23.

Johnson, M. P., and S. Schaltegger. 2020. "Entrepreneurship for Sustainable Development: A Review and Multilevel Causal Mechanism Framework." *Entrepreneurship Theory and Practice* 44, no. 6: 1141–1173.

Kennedy, P. 1992. *A Guide to Econometrics*. Blackwell.

Khan, M. A., S. S. Zubair, and S. N. M. Shah. 2022. "Influence of Emotional Intelligence on Enterprise Performance With Mediating Role of Entrepreneurial Resilience: A Case of SMEs in Pakistan Under the Light of Covid-19." *Transnational Corporations Review* 14, no. 1: 1–15.

Kolvereid, L. 1996a. "Organizational Employment Versus Self-Employment: Reasons for Career Choice Intentions." *Entrepreneurship Theory and Practice* 20, no. 3: 23–31.

Kolvereid, L. 1996b. "Prediction of Employment Status Choice Intentions." *Entrepreneurship Theory and Practice* 21, no. 1: 47–58.

Krueger, N. F., and A. L. Carsrud. 1993. "Entrepreneurial Intentions: Applying the Theory of Planned Behaviour." *Entrepreneurship & Regional Development* 5, no. 4: 315–330.

Krueger, N. F., M. D. Reilly, and A. L. Carsrud. 2000. "Competing Models of Entrepreneurial Intentions." *Journal of Business Venturing* 15, no. 5–6: 411–432.

Kruse, P., D. Wach, S. Costa, and J. A. Moriano. 2019. "Values Matter, Don't They? Combining Theory of Planned Behavior and Personal Values as Predictors of Social Entrepreneurial Intention." *Journal of Social Entrepreneurship* 10, no. 1: 55–83.

Kuckertz, A., and M. Wagner. 2010. "The Influence of Sustainability Orientation on Entrepreneurial Intentions: Investigating the Role of Business Experience." *Journal of Business Venturing* 25, no. 5: 524–539.

Lans, T., V. Blok, and R. Wesselink. 2014. "Learning Apart and Together: Towards an Integrated Competence Framework for Sustainable Entrepreneurship in Higher Education." *Journal of Cleaner Production* 62: 37–47.

Leal Filho, W., D. A. Kirby, T. F. A. C. Sigahi, R. L. F. Bella, R. Anholon, and O. L. G. Quelhas. 2025. "Higher Education and Sustainable Entrepreneurship: The State of the Art and a Look to the Future." *Sustainable Development* 33, no. 1: 957–969.

Morgenroth, T., M. K. Ryan, and K. Peters. 2015. "The Motivational Theory of Role Modeling: How Role Models Influence Role Aspirants' Goals." *Review of General Psychology* 19, no. 4: 465–483.

Mulder, M. 2014. "Conceptions of Professional Competence." In *International Handbook of Research in Professional and Practice-Based Learning*, edited by S. Billett, C. Harteis, and H. Gruber, 107–137. Springer.

Muñoz, P., and B. Cohen. 2018. "Sustainable Entrepreneurship Research: Taking Stock and Looking Ahead." *Business Strategy and the Environment* 27, no. 3: 300–322.

Ploum, L., V. Blok, T. Lans, and O. Omta. 2018. "Toward a Validated Competence Framework for Sustainable Entrepreneurship." *Organization and Environment* 31, no. 2: 113–132.

Preacher, K. J., and A. F. Hayes. 2008. "Asymptotic and Resampling Strategies for Assessing and Comparing Indirect Effects in Multiple Mediator Models." *Behavior Research Methods* 40, no. 3: 879–891.

Rauch, A., and M. Frese. 2007. "Let's Put the Person Back Into Entrepreneurship Research: A Meta-Analysis on the Relationship Between Business Owners' Personality Traits, Business Creation, and Success." *European Journal of Work and Organizational Psychology* 16, no. 4: 353–385.

Roczen, N., F. G. Kaiser, F. X. Bogner, and M. Wilson. 2014. "A competence Model for Environmental Education." *Environment and Behavior* 46, no. 8: 972–992.

Rucker, D. D., K. J. Preacher, Z. L. Tormala, and R. E. Petty. 2011. "Mediation Analysis in Social Psychology: Current Practices and New Recommendations." *Social and Personality Psychology Compass* 5, no. 6: 359–371.

Sánchez, J. C. 2011. "University Training for Entrepreneurial Competencies: Its Impact on Intention of Venture Creation." *International Entrepreneurship and Management Journal* 7, no. 2: 239–254.

Schaltegger, S., and M. Wagner. 2011. "Sustainable Entrepreneurship and Sustainability Innovation: Categories and Interactions." *Business Strategy and the Environment* 20, no. 4: 222–237.

Shabbir, M. S. 2023. "Exploring the Relationship Between Sustainable Entrepreneurship and the United Nations Sustainable Development Goals: A Comprehensive Literature Review." *Sustainable Development* 31, no. 4: 3070–3085.

Shapero, A., and L. Sokol. 1982. "The Social Dimensions of Entrepreneurship." In *Encyclopedia of Entrepreneurship*, edited by C. A. Kent, D. L. Sexton, and K. H. Vesper, 72–90. Prentice Hall.

Shepherd, D. A., and H. Patzelt. 2011. "The New Field of Sustainable Entrepreneurship: Studying Entrepreneurial Action Linking 'What Is to Be Sustained' With 'What Is to Be Developed'." *Entrepreneurship Theory and Practice* 35, no. 1: 137–163.

Srivastava, M., S. Shivani, and S. Dutta. 2024. "Antecedents of Sustainability-Oriented Entrepreneurial Intentions: A Comprehensive Model and Empirical Evidence." *Sustainable Development* 32, no. 3: 1774–1791.

Stern, M. J., B. T. Frensley, R. B. Powell, and N. M. Ardoin. 2018. "What Difference Do Role Models Make? Investigating Outcomes at a Residential Environmental Education Center." *Environmental Education Research* 24, no. 6: 818–830.

St-Jean, E., and F. Labelle. 2018. "Wanting to Change the World, Is It Too Much of a Good Thing? How Sustainable Orientation Shapes Entrepreneurial Behaviour." *International Journal of Entrepreneurial Behavior & Research* 24, no. 6: 1108.

Taube, O., M. A. Ranney, L. Henn, and F. G. Kaiser. 2021. "Increasing People's Acceptance of Anthropogenic Climate Change With Scientific Facts: Is Mechanistic Information More Effective for Environmentalists?" *Journal of Environmental Psychology* 73: 101549.

Tenner, I., and J. Hörisch. 2021. "Diversity Matters: The Influence of Gender Diversity on the Environmental Orientation of Entrepreneurial Ventures." *Journal of Business Economics* 91, no. 7: 1005–1023.

Tesch, D., and W. Kempton. 2004. "Who Is an Environmentalist? The Polysemy of Environmentalist Terms and Correlated Environmental Actions." *Journal of Ecological Anthropology* 8, no. 1: 67–83.

Thompson, E. R. 2009. "Individual Entrepreneurial Intent: Construct Clarification and Development of an Internationally Reliable Metric." *Entrepreneurship Theory and Practice* 33, no. 3: 669–694.

Thornton, P. H., and K. Klyver. 2019. "Who Is More Likely to Walk the Talk? The Symbolic Management of Entrepreneurial Intentions by Gender and Work Status." *Innovation* 21, no. 1: 102–127.

Vuorio, A. M., K. Puumalainen, and K. Fellnhofer. 2018. "Drivers of Entrepreneurial Intentions in Sustainable Entrepreneurship." *International Journal of Entrepreneurial Behavior & Research* 24, no. 2: 359–381.

Wals, A. E., and B. Jickling. 2002. ""Sustainability" in Higher Education: From Doublethink and Newspeak to Critical Thinking and Meaningful Learning." *International Journal of Sustainability in Higher Education* 3, no. 3: 221–232.

Weber, R. 2012. *Evaluating Entrepreneurship Education*. Gabler Verlag.

Wesselink, R., V. Blok, S. van Leur, T. Lans, and D. Dentoni. 2015. "Individual Competences for Managers Engaged in Corporate Sustainable Management Practices." *Journal of Cleaner Production* 106: 497–506.

Wyrwich, M., M. Stuetzer, and R. Sternberg. 2016. "Entrepreneurial Role Models, Fear of Failure, and Institutional Approval of Entrepreneurship: A Tale of Two Regions." *Small Business Economics* 46, no. 3: 467–492.