

## Research

# Fostering potential entrepreneurs: an empirical study of the drivers of green self-efficacy in Saudi Arabia

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## Abstract

The positive role of entrepreneurship and micro and small enterprises in providing job opportunities necessitated a further investigation into the critical individual factors motivating individuals and potential entrepreneurs (students) to develop their entrepreneurial intentions and act green. Accordingly, we aimed to examine the effects of crucial factors—environmental self-identity (ESI) and green mindfulness (GM)—on students' (potential entrepreneurs') development of green self-efficacy (GSE) and to examine the influence of GSE on their green entrepreneurial intentions (GEIs). The study sample of 202 potential entrepreneurs was drawn from two Applied and Business Administration Colleges at King Faisal University. The collected data were analysed and interpreted using partial least squares structural equation modelling (PLS-SEM). The research produced exciting results showing that ESI and GM positively influenced GSE and that GSE positively affected GEI. The results also revealed GSE's capability to mediate the connection between GM, ESI, and GEI. This paper concludes by providing several suggestions for decision-makers in the study context.

**Keywords** Employment · Potential entrepreneurs · Saudi Arabia · Students

## 1 Introduction

A green economy can reduce poverty, improve people's quality of life, and ensure long-term economic development [1]. As the most valuable mechanism of the green economy, green entrepreneurship plays a crucial role in ecological protection by addressing diverse social and environmental issues [1–3]. According to Abdelwahed et al. [4], green entrepreneurship is a primary driver of the green economy due to its ability to support sustainable development. Ecological preservation enhances environmental quality, and green enterprises can reduce environmental degradation as well [2]. Perhaps this is why green entrepreneurship is claimed to be a novel expression of sustainability [5]. Many countries, including Saudi Arabia, are working positively to promote green entrepreneurship [2, 6], because it favourably impacts sustainable development. When institutions align entrepreneurial efforts with the economic, social, and environmental aspects of sustainable development, they can generate a favourable triple-bottom-line effect.

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Entrepreneurial intentions are widely acknowledged as a significant individual-level predictor of entrepreneurial behaviour [2]. More specifically, green entrepreneurial intentions (GEIs) are known to have a direct positive effect on green entrepreneurial behaviour [2]. In this regard, Soomro et al. [1] stressed the importance of fostering university students' initiatives to start sustainable future businesses. Since young people possess a higher entrepreneurial spirit than other age groups, we need to consider several dynamic, complex, and innovative business components across potential entrepreneurs. Thanks to the development of entrepreneurship education, many university students have embarked on entrepreneurial careers with a focus on strategic and environmentally friendly industries. Hence, researchers and policymakers are justified in exploring GEIs among students [2].

Due to its potential to tackle global sustainability issues, green entrepreneurship is gaining the attention of academics and industry professionals. Refs. [7, 8] argued that efforts are greatly needed to achieve progress toward the Sustainable Development Goals (SDGs) as coined by the United Nations, one of which focuses on environmental ventures, making it essential to understand the determinants involved. However, a lack of empirical studies on green entrepreneurship has limited our understanding of the factors that nurture GEIs [3], and further research is required to identify their determinants. Moreover, it is vital to establish whether individual-level variables influence GEIs [2]. According to Yi [2], further research on such factors is needed, particularly to explore university students' GEIs and green behaviour.

Among Saudi Arabian university students, the associations between such variables require further investigation because they play a vital role in the country's well-being and economic development [4]. Hence, in this research, we aimed to examine the effects of environmental self-identity (ESI) and green mindfulness (GM) on green self-efficacy (GSE) and how they influenced GEIs among a study sample of students in Saudi Arabia. In line with Alvarez-Risco et al. [8], we argue that apart from extending the current literature, the findings of this study can assist policymakers and universities in developing strategies for promoting ecological ventures and ensuring that students possess the traits required to pursue entrepreneurship.

This paper is structured as follows: it begins with an introduction, followed by a review of the literature and the hypothesis development; the next section explains the research methodology, findings, and data analysis; and the subsequent sections present the discussion, conclusion, and contributions.

## 2 Literature review and hypothesis development

### 2.1 Context of Saudi Arabia

Saudi Arabia has become an environmentally conscious nation [9], having formulated the National Transformation 2020 and Vision 2030 programmes to promote entrepreneurship and innovation as mechanisms to grow the local enterprises that play a vital role in the nation's economy. Moreover, the Middle East Green Initiative, the Green Initiative, and the Green Riyadh Project have made Saudi Arabia a favourable environment for green entrepreneurship, supported by several government initiatives to encourage green individual entrepreneurs that offer funding, mentoring, and training to green businesses [10]. Saudi Vision 2030 focuses on environmental sustainability as a critical factor for national development [11]. As outlined in the Saudi Vision 2030 goals, a key focus of the vision's three pillars (i.e. a vibrant community, a thriving economy, and developing a homeland) is to increase environmentally friendly activities, including green entrepreneurship [9]. However, it has been noted that Saudi Arabia suffers from extensive misunderstandings and misrepresentations in the existing literature, particularly in terms of its mechanisms and societal structures [11]. Furthermore, Alshebami et al. [10] asserted that the distinctiveness of Saudi Arabia's higher education system is significant, and thorough studies are scarce on the elements impacting GEIs in the country. Thus, Saudi Arabia was a suitable context in which to study university students' GEIs and bridge significant gaps in the existing literature.

### 2.2 Theoretical background

This research is based on Bandura's Social Cognitive Theory (1977) [12], stating that individuals gain knowledge by noticing and observing others and their surroundings, learning from watching others and the feedback they receive. Accordingly, once the students are exposed to mindfulness and environmental identities in their surroundings, they can develop better self-efficacy and consequently obtain higher levels of confidence directed toward performing entrepreneurial activities [12, 13]. In this study, we discuss different concepts, namely environmental self-identity [14], green

mindfulness [15], green self-efficacy [12] and green entrepreneurial intention [13], which are discussed in detail in the following sections.

## 2.3 Hypothesis development

### 2.3.1 ESI, GSE, and GEIs

Self-identity is an essential and robust predictor of intentions, including entrepreneurial intentions [16]. In Saudi Arabia, people's sense of identity relates to their self-awareness and self-concern based on the feeling of belonging to a specific group or tribe [9]. ESI can be described as a sense of association with nature, which may encourage individuals to develop a feeling of attachment to nature and foster environmentally friendly behaviours [17]. In other words, ESI refers to the degree to which individuals believe their behaviours are proenvironmental. This study operationalised ESI as the degree to which individuals viewed themselves as people whose activities were eco-friendly and protected their surroundings [14].

We understood GSE as a significant construct that could integrate individual personality traits with environmental aspects, thereby enhancing entrepreneurial intentions [18]. The stronger an individual's ESI, the likelier he or she is to engage in pro-environmental behaviour. However, to be successful in this, he or she must also have environmental self-efficacy. According to Lauren et al. [19], engaging in environmentally friendly behaviour depends on self-efficacy, which can increase the motivation to develop innovative or challenging environmental behaviours. Empirically, Chen et al. [17] revealed that ESI and self-efficacy are critical factors in enabling individuals to advocate autonomously for environmentally conscious practices. More recently, Alshebami et al. [10] showed that ESI positively affects GEIs. An earlier study by Celuch et al. [20] revealed that self-efficacy supports students' self-identities as critical thinkers. Furthermore, Kim et al. [21] showed that students with higher degrees of self-identity can adjust more positively, resulting in stronger self-efficacy in career decision-making. As a result, we formulated the following hypothesis (H):

H1: ESI positively influences GSE.

### 2.3.2 GM, GSE, and GEIs

GM is a technique that cultivates and shapes awareness of and associations with nature based on the current moment, maintaining an unprejudiced attitude and empathetic behaviour towards nature, developing a feeling and oneness for the environment, and fostering a sense of unity with the environment [10]. We operationalised GM as a condition or state of deliberate consciousness by which people obtain a greater awareness of and knowledge about nature, the environment, and the context [15]. According to Abdelwahed et al. [4], GM and entrepreneurial self-efficacy are critical concepts that mediate the connection between green creativity, a shared vision, performance, and green transformational leadership. In a related context, Kardoyo et al. [22] revealed that enhanced GM was necessary to improve support for university environmental policies. Additionally, Kardoyo et al. [23] confirmed a positive link between mindfulness, social support, and social entrepreneurial intentions among students, with mindfulness being the strongest predictor of entrepreneurial intentions. Empirically, Alshebami et al. [10] showed that GM has a positive and significant effect on GEIs. A separate study Cai et al. [24] found that GM promotes GEIs through intrinsic green motivations. Interestingly, Firth et al. [25] obtained mixed results regarding how mindfulness influences self-efficacy. A more recent study Sharma et al. [26] found that mindfulness is positively associated with self-efficacy. Earlier, Greason et al. [27] echoed that mindfulness is a significant determinant of self-efficacy. Hence, we developed the following hypothesis:

H3: GM positively influences GSE.

### 2.3.3 GSE and GEIs

GSE can be defined as individuals' belief that they can implement and support environmental protection. Intentions are vital components of the behaviour of individuals [13], and the existing literature generally supports the idea that high self-efficacy motivates most human performance [3]. Entrepreneurial intentions are a crucial individual-level factor that predicts entrepreneurial behaviour [2]. More specifically, Himel et al. [28] articulated that self-efficacy, awareness, and feasibility can predict individuals' GEIs and behaviour. According to Abdelwahed et al. [4], entrepreneurial GSE refers to individuals' confidence in contributing to solving environmental issues by demonstrating self-assurance in pro-environmental activities. It has been argued that self-efficacy mediates the association between perseverance, premeditation,

and intentions to become an entrepreneur [4]. In a related context, Hussain et al. [29] found that self-efficacy had an indirect but significant impact on green, sustainable entrepreneurial intentions among students. Empirically, Chen et al. [17] found that environmental self-efficacy and related self-identity were key elements in forming self-driven green opinion leaders. Particularly in the case of university students, self-efficacy is known to positively impact entrepreneurial intentions [4, 7, 8]. Hence, we formulated the following hypothesis:

H5: GSE positively influences GEI.

### 2.3.4 Mediating effect of GSE

The concept of self-efficacy has been defined mainly as people's ability and confidence to complete specific duties and tasks or meet certain job-related expectations [30]. We propose a direct effect of GM and ESI on GSEs, followed by the immediate influence of GSEs on GEI. This framework logically suggests a mediating role for GSE among ESI, GM, and GEI. According to Abdelwahed et al. [4], self-efficacy mediates the association between perseverance, premeditation, and intentions to become entrepreneurs. Moreover, several existing literature found significant mediating influence of GSE [15, 29, 30]. Therefore, based on the above, we developed the following hypotheses:

H2: The relationship between ESI and GEI is mediated by GSE.

H4: The relationship between GM and GEI is mediated by GSE.

## 2.4 Research model

Figure 1 shows the research model for this study, revealing that ESI, GM, and GSE were independent variables, while GEI was a dependent variable. The model further indicated GSE as the mediator in the study.

## 3 Methodology

### 3.1 Research design, data collection, and participants

While a strong focus has been placed on the ability of entrepreneurship and small businesses to enable people, in general, to become independent, have jobs, and reduce their poverty levels, emphasis has also been directed towards preparing potential entrepreneurs (i.e. students) to become successful entrepreneurs. While students are preparing to commence income-generating activities, they must ensure that their likely entrepreneurial businesses are green-oriented. They must develop specific green values, perceptions, and mentalities to ensure that their efforts are directed towards establishing eco-friendly entrepreneurial ventures. Hence, we argue that for potential entrepreneurs (students) to have GEIs and start green businesses, they must strengthen their GSE to have the confidence to run their businesses.

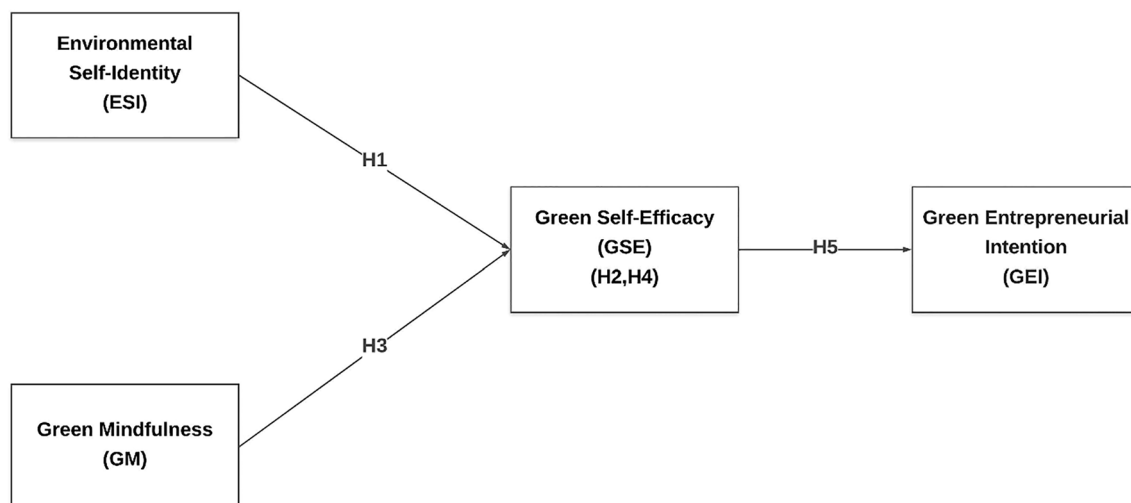


Fig. 1 Theoretical framework of the research. Source: Author development

Developing GSE depends on many factors, including ESI and GM, both of which strengthen concern and commitment to environmental issues, help individuals understand the interconnectedness of nature, and enable them to make the right choices to support and enhance sustainability. In this regard, Saudi Arabia has developed Saudi Vision 2030, which is a strategic plan that aims to create a thriving economy, a vital society, and an ambitious state. Saudi Vision 2030 also focuses on developing green entrepreneurship and small businesses [31, 32]. Accordingly, through this research, we contribute to Saudi Vision 2030 by attempting to understand how key factors (ESI and GM) enhance the GSE of potential entrepreneurs and how GSE develops GEIs. After thoroughly reviewing the literature and selecting the necessary constructs for the study, we developed a conceptual model. We then collected a sample of 202 participants from students in the Applied and Business Administration Colleges, which comprised students from different programmes (human resources management, accounting, finance, and information technology) affiliated with King Faisal University. These students continuously received entrepreneurial training and information about entrepreneurship and small enterprise management and were constantly exposed to entrepreneurial networks. The sample was deemed suitable according to the 10-times rule, which requires that the sample size of any study be at least 10 times greater than the maximum number of outer or inner model links pointing to any latent variable of the research model [33].

This study was deductive and quantitative and based on convenience sampling, which is regarded as an easy, flexible method of data collection that has been used for both quantitative and qualitative studies [34]. A survey was created in English and later translated into Arabic to cater to the target Arabic-speaking audience. Professional translators were employed to ensure the accuracy of the translations. Once the translation was completed, we conducted a pilot study and distributed around 15 questionnaires to check for any problems with their content. The pilot study participants reported no issues. Hence, we distributed the final survey to respondents from January to February 2023.

### 3.2 Study measures

To ensure validity and reliability, we performed a deep search of the previous literature to identify suitable and authentic measures that could be used in the research. To measure the GM and GEI variables, we adopted the measures developed by [24]. Other questions used in the study were also drawn from previous studies, such as [14], which posed questions related to the concept of ESI. Finally, GSE questions were adopted from [18]. For further clarification of the questions and measures used in the study, we have attached the questionnaire in the [Appendix](#).

## 4 Findings

### 4.1 Findings related to demographic information analysis

As previously stated, the study sample included 202 students from two colleges affiliated with King Faisal University. This questionnaire was completed by male and female respondents (59% male and 41% female). Regarding age, 94% of the study participants were aged 18–24 years, 5% were aged 25–31 years, and 1% were aged 32–38 years. Furthermore, 90% of the respondents stated that they were single, 9% were married, and 1% were neither single nor married.

### 4.2 Findings related to data analysis

Because of the present study's exploratory nature and the small sample size, we employed partial least squares structural equation modelling (PLS-SEM) for this study, which was conducted in two steps, as follows:

#### 4.2.1 Analysis of the measurement model

Examining the measurement model is considered the first step in PLS-SEM. We used it to check the validity and reliability of both variables and their items or indicators in this study, which helped in understanding the status of the developed model. Many tests are conducted in this step, such as examining the composite reliability (CR), Cronbach's alpha (CA), average variance extracted (AVE), and variance inflation factor (VIF). We started the measurement by examining the indicator loadings of the constructs used in the study. A threshold of 70% for indicator loadings has been recommended. Indicators with loadings of 70% and above loadings are recommended, as their loading values indicate the ability of their constructs to explain 50% of the variance in those measures, meaning that the measure is a strong indicator of the

underlying construct [35]. Another classification of indicator loadings reported that indicator loadings between 0.40 and 0.70 were acceptable [36, 37]. Our results in Table 1 show that we met the recommended threshold. The second step was to examine the internal consistency and reliability of the study constructs using CA and CR. The threshold for both CR and CA was 70%, indicating good internal consistency and reliability [38]. Our findings related to CR and CA showed that we met the recommended threshold. We proceeded to assess the AVE, which is a metric indicating the extent of variance attributed to a construct relative to the variance stemming from measurement error. The AVE threshold is 50%, with higher AVE values indicating a stronger relationship between the construct and its measures. The findings revealed that the suggested values were met. We then examined the multicollinearity by using the VIF to check the correlation among the independent variables. Our findings in Table 1 show that no multicollinearity existed because all the values were below 5 [38].

We then examined the discriminant validity of the study's construct by applying the Fornell–Larcker criterion to evaluate how different the study constructs were. The criterion is used to explicitly check whether the AVE square root for each construct is higher than its correlation with other constructs in the model. If so, the construct investigated has discriminant validity [39]. Our results showed that the study constructs had excellent discriminant validity, as shown in Table 2.

We then evaluated common method bias in the study by employing Harman's single-factor test. The outcome, in line with [40], confirmed the absence of any significant common bias in the study. Moreover, the lower than 2 VIF value, supports that no significant common method bias exists in the present study.

#### 4.2.2 Analysis of the structural model

Structural model analysis requires several tests to obtain the required results. We used the bootstrapping method to check the path value results and their significance [31]. For the structural model, we employed regression analysis to examine the relationships among exogenous variables and endogenous variables, and we applied different tests, such as the coefficient of determination ( $R^2$ ),  $p$ -value, and  $t$ -value [33]. The results of the regression test showed that all the proposed hypotheses were supported, and this support is further elaborated on in the Discussion section. It should be

**Table 1** Representation of the measurement Model reliability and validity. Source: Primary data

Construct and items	Loading	CA	CR	AVE	Inner VIF
Environmental self-identity		0.876	0.879	0.801	1.312
ES1	0.867				
ES2	0.924				
ES3	0.892				
Green entrepreneurial intention		0.925	0.930	0.728	–
GE1	0.812				
GE2	0.811				
GE3	0.873				
GE4	0.900				
GE5	0.878				
GE6	0.842				
Green mindfulness		0.799	0.804	0.500	1.312
GM1	0.711				
GM2	0.715				
GM3	0.747				
GM4	0.628				
GM5	0.680				
GM6	0.753				
Green self-efficacy		0.915	0.921	0.749	1.000
GSE1	0.767				
GSE2	0.907				
GSE3	0.894				
GSE4	0.885				
GSE5	0.865				

**Table 2** Fornell-Larcker criterion. Source: Primary data

	Environmental self-identity (ESI)	Green entrepreneurial intention (GEIs)	Green mindfulness (GM)	Green self efficacy (GSE)
Environmental self-identity (ESI)	0.895			
Green entrepreneurial intention (GEIs)	0.567	0.853		
Green mindfulness (GM)	0.487	0.635	0.707	
Green self efficacy (GSE)	0.591	0.773	0.654	0.865

noted that both  $R^2$  and  $F^2$  values were required because they reflect the goodness of fit of a regression model. According to [41, 42], the  $R^2$  level can be evaluated using three criteria: =0.26 (significant), =0.13 (moderate), and =0.02 (weak). In our investigation, the  $R^2$  revealed that GSE explained around 59.8% of the variance in EI. Furthermore, ESI and GM explained roughly 52.5% of the variance in GSE. Regarding the effect size ( $F^2$ ), as per the guidelines of (Cohen, 1988), we evaluated the effect size according to three categories (=0.02, =0.15 and =0.35), indicating weak, moderate, and substantial effects, respectively, of the exogenous variables on the dependent variables. Our results revealed a substantial effect of GM on GSE (36.9%), while a moderate effect existed between ESI and GSE (20.5%). The final recommended test for the structural model was for predictive relevance, namely  $Q^2$ . In the  $Q^2$  test, the obtained values were more significant than zero, indicating the good predictive relevance of the study model. We have also run The Herman test to check for any common method bias in the data. The result was reported as 47%, below the recommended threshold, indicating no common method bias in the study.

Table 3 summarises the study's hypothesis findings.

Figure 2 shows the different path coefficients of the study model.

## 5 Discussion

A common instrument for achieving progress towards SDGs is the fostering of environmental ventures, which is why universities around the globe are relentlessly working to formulate specific programmes and strategies to promote entrepreneurship, making it necessary to explore and comprehend the variables that explain students' intentions towards green entrepreneurship [8]. Soomro et al. [1] argued that young people worldwide represent a new generation of entrepreneurs, and it is both timely and significant to investigate their propensity for green entrepreneurship. Therefore, we examined the effects of ESI and GM on GSE and, subsequently, on GEIs among tertiary students in Saudi Arabia. The results revealed a positive influence of ESI on GSE, confirming H1. In line with earlier studies [20, 21], this translated to the degree to which people think that their behaviours are environmentally friendly, influencing their confidence in their ability to venture into green entrepreneurship.

The findings further revealed that GM had a significant positive effect on GSE, confirming H3. In line with previous studies [26, 27, 43], this indicated that awareness of and association with the environment strengthened individuals' belief in their ability to implement and support environmental protection through green entrepreneurship. Regarding GSE, the results showed a positive significant effect on GEIs, confirming H5 and concurring with the existing literature [2, 4, 8, 17]. This suggests that the higher individuals' confidence in their ability to contribute to solving environmental issues

**Table 3** Testing of hypotheses. Source: Primary analysis

Hypothesis	Relationship	Path coefficient	Mean	t- value	P- values	Decision
Direct relationship						
H1	ESI—> GSE	0.358	0.357	6.269	0.000	Supported
H3	GM—> GSE	0.479	0.483	8.230	0.000	Supported
H5	GSE—> GEI	0.773	0.776	24.112	0.000	Supported
Indirect relationship						
H2	ESI—> GSE—> GEI	0.277	0.277	6.042	0.000	Supported
H4	GM—> GSE—> GEI	0.371	0.375	7.429	0.000	Supported

*T-value* > 1.96, ( $p < 0.05$ )

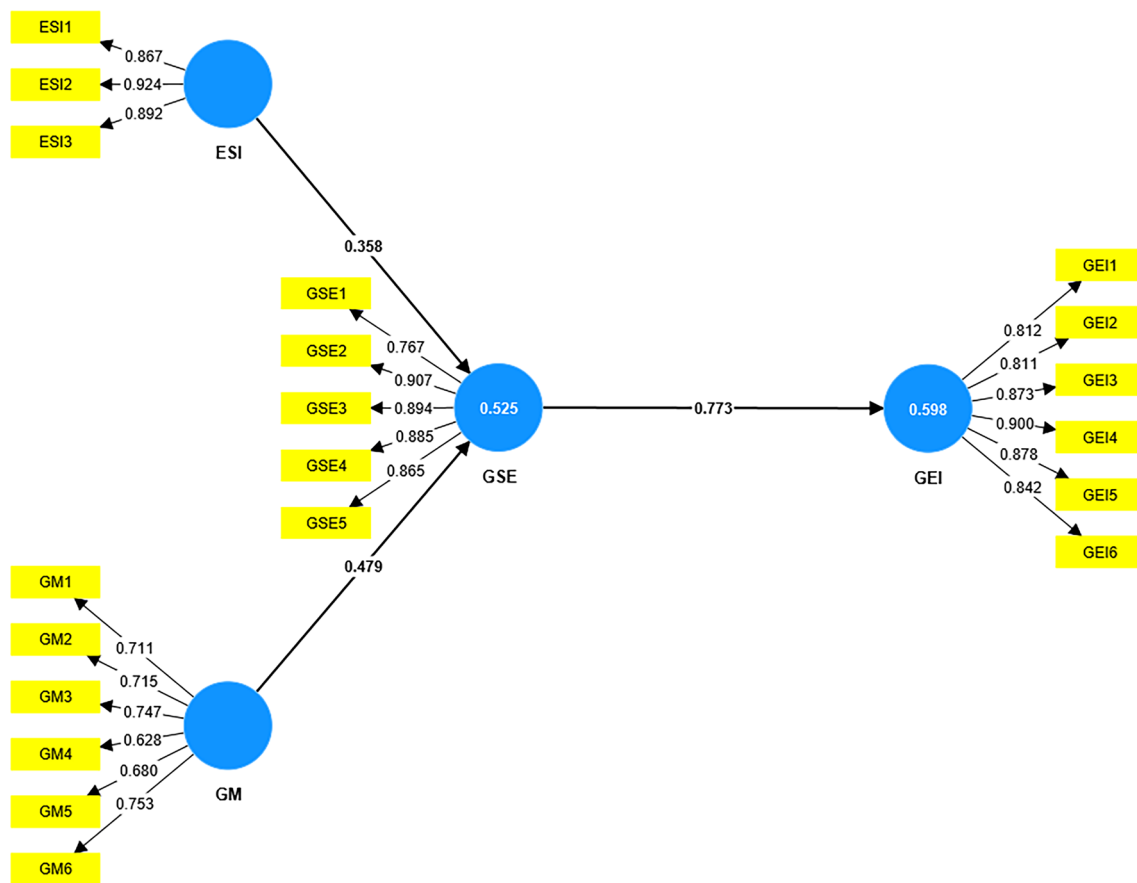


Fig. 2 Paths coefficients. Source: Primary data

by demonstrating self-assurance in proenvironmental activities, the likelier it is that they will engage in environmentally friendly entrepreneurship. Finally, the significant indirect effects of ESI and GM on green entrepreneurship supported H2 and H4, aligning with [4, 15, 30] and indicating that GSE significantly mediated the effects of ESI and GM on GEIs among university students in Saudi Arabia.

## 6 Conclusion

Enhancing entrepreneurship and micro and small enterprises is essential because they are influential in providing job opportunities and improving people's overall standard of living. Entrepreneurship training is also vital for potential entrepreneurs (students) in shaping their attitudes, directing their behaviour towards becoming independent entrepreneurs, and enabling them to earn living incomes. Recently, efforts have been made to enhance entrepreneurial intentions among potential entrepreneurs, but the focus has also been directed towards supporting their business plans, with the aim of aligning their entrepreneurial activities with environmental protection principles to achieve economic and social sustainability. Supporting eco or green entrepreneurial activities has become an essential goal of governments and organisational bodies around the world, especially in developing countries such as Saudi Arabia, based on the belief that small and microenterprises and their activities, regardless of type and size, harm society and the environment. Accordingly, various attempts have been made to support their eco-friendly activities, including in Saudi Arabia. Attempts to foster green entrepreneurial engagement in Saudi Arabia have been made via Saudi Vision 2030, which aims to develop a vital society and a flourishing economy. Saudi Vision 2030 provides necessary support for those interested in pursuing green entrepreneurial activities that ultimately contribute to improving the standard of living of individuals in Saudi Arabia and strengthening the country's overall economy.



Accordingly, we aimed to understand the key factors contributing to strengthening the confidence of potential entrepreneurs (students) to start green entrepreneurship in Saudi Arabia. We considered critical variables (GM and ESI) that are considered necessary antecedents of entrepreneurial self-efficacy, resulting in GEIs. We gathered data from 202 participants enrolled in the Applied and Business Administration Colleges affiliated with King Faisal University in Saudi Arabia. We analysed and interpreted the collected data using statistical tools and techniques such as PLS-SEM. The study produced exciting findings indicating that both ESI and GM can positively influence ESI. In addition, the results revealed ESI's ability to positively impact the study respondents' entrepreneurial intentions. In other words, to strengthen individuals' ESI, there is a need to enrich their GM and ESI. Stronger ESI can help them develop a heightened sense of purpose and meaning in their actions. When individuals see the environment as an integral part of their identities and values, they believe in their ability to positively impact the environment by pursuing green activities.

Furthermore, individuals with high levels of GM are better able to engage in sustainable behaviours. High levels of GM make individuals pay more attention to their behaviours; accordingly, they can quickly grasp the effect of their efforts on the environment and understand the necessity of developing strategies to minimise negative influences on the environment. This study is essential because it provides recommendations for policymakers and potential entrepreneurs. It also provides a platform for future researchers to investigate other variables that contribute to inculcating GSE and GEIs among potential entrepreneurs in Saudi Arabia.

## 7 Implications

### 7.1 Theoretical implications

This study is one of the limited research studies to concentrate on increasing GEIs and identifying critical elements that impact GSE among future entrepreneurs, specifically students. This study adds to the current literature by providing evidence of the importance of two crucial factors required for students to build higher levels of GSE in support of their green entrepreneurial ambitions. The study contributes to an enhanced understanding of the critical psychological mechanisms that promote green and sustainable businesses. This research presents empirical evidence of the role of ESI and GM in affecting people's green behaviours and self-efficacy. It also confirms that the developed model is appropriate for the context of the study. Researchers should consider other factors to help students establish GEIs and increase their self-efficacy for green behaviour. The study model could be adapted by including new variables, such as moderators and mediators. However, the study is not without limitations. Firstly, the small sample size limits our ability to generalize findings. Hence, it is recommended that future researchers should attempt to use a bigger sample size for broader generalizability. Secondly, this study solely, focused on two colleges affiliated with King Faisal University, which could have limited our results. Therefore, to better reflect the population future researchers could adopt a broader sampling frame.

### 7.2 Practical implications

We attempted to identify the key factors that enhance GSE and GEIs among potential entrepreneurs in Saudi Arabia. The findings of this research provide recommendations for policymakers, educational institutions, and training and development organisations regarding the need to focus on ESI and GM and how to enhance them among students. This is significant because GM and ESI strengthen students' GSE and lead to the formation of GEIs. In this vein, universities and other educational institutions should focus on introducing different syllabi and entrepreneurial content to enhance students' self-identities and mindfulness regarding the environment. They should also focus on providing vital entrepreneurial training, workshops, and guidelines to enhance students' GM and ensure the development of green environmental values. Educational and research institutions should encourage research activities and support researchers in investigating other variables that strengthen students' GSE.

**Author contributions** All authors whose names appear on the submission made substantial contributions to the conception or design of the work. All authors contributed equally.

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**Data availability** The data used to support the findings of this study are available upon request. However, please note that the data for this article were generated as part of a project funded partially by King Faisal University. Due to the nature of the funding and to protect intellectual property rights, the data cannot be shared without prior permission from King Faisal University.

**Code availability** Not applicable.

## Declarations

**Ethics approval and consent to participate** The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Ethics Committee of King Faisal University (KFU-REC-2023-MAR-ETHICS721).

**Informed consent** Informed consent was obtained from all subjects involved in the study.

**Competing interests** The authors declare that there is no competing interests.

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## Appendix

### Questionnaire

#### Green mindfulness (GM)

I feel free to discuss environmental issues and problems.

I am encouraged to express different views concerning environmental issues and problems.

I pay attention to what is happening if unexpected environmental issues and problems arise.

I am inclined to report environmental information and knowledge that have significant consequences.

I am rewarded if I share and announce new environmental information and knowledge.

I know what is readily available for consultation if unexpected environmental issues and problems arise.

#### Green entrepreneurial intentions (GEI)

I am ready to do anything to be an entrepreneur who promotes environmentalism.

My professional goal is to be a green entrepreneur.

I will make every effort to start and run my own venture that promotes environmentalism.

I am very determined to create a venture that promotes environmentalism in the future.

I have very seriously thought of starting a firm that promotes environmentalism in some way.

I have the firm intention to start a green venture someday.

#### Environmental Self-Identity (ESI)

I am the type of person who acts environmentally friendly,

Acting environmentally friendly is an important part of who I am.

I see myself as an environmentally friendly person.

## Green Self-Efficacy (GSE)

I feel motivated to brainstorm about product innovation.

I believe my abilities to produce green products innovatively.

I feel confident about identifying new markets for green products.

After failure of a specific product, I still feel motivated to try other green ideas.

I think I can find creative solutions to environmental problems.

## References

1. Soomro BA, Ghumro IA, Shah N. Green entrepreneurship inclination among the younger generation: an avenue towards a green economy. *Sustain Dev.* 2020;28(4):585–94.
2. Yi G. From green entrepreneurial intentions to green entrepreneurial behaviors: the role of university entrepreneurial support and external institutional support. *Int Entrep Manag J.* 2021;17(2):963–79.
3. Chee W, Nordin N. Green entrepreneurial intention of Mba students: a Malaysian study. *Int J Ind Manag.* 2020;5:38–55.
4. Abdelwahed NA, Al Doghan MA, Saraih UN, Soomro BA. Green entrepreneurship in Saudi Arabia: shaping the landscape of the greener economy. *J Small Bus Enterp Dev.* 2023. <https://doi.org/10.1108/JSBED-05-2023-0239>.
5. Makki AA, Alidrisi H, Iqbal A, Al-Sasi BO. Barriers to green entrepreneurship: an ISM-based investigation. *J Risk Financ Manag.* 2020;13(11):249.
6. Alwakid W, Aparicio S, Urbano D. The influence of green entrepreneurship on sustainable development in Saudi Arabia: the role of formal institutions. *Int J Environ Res Public Health.* 2021;18(10):5433.
7. Shabeeb Ali MA, Ammer MA, Elshaer IA. Born to be green: antecedents of green entrepreneurship intentions among higher education students. *Sustainability.* 2023;15(8):6668.
8. Alvarez-Risco A, Młodzianowska S, García-Ibarra V, Rosen MA, Del-Aguila-Arcentales S. Factors affecting green entrepreneurship intentions in business university students in COVID-19 pandemic times: case of Ecuador. *Sustainability.* 2021;13(11):6447.
9. Alwakid W, Aparicio S, Urbano D. Cultural antecedents of green entrepreneurship in Saudi Arabia: an institutional approach. *Sustainability.* 2020;12(9):3673.
10. Alshebami AS, Alholiby MS, Elshaer IA, Sobaih AEE, Al Marri SH. Examining the relationship between green mindfulness, spiritual intelligence, and environmental self identity: unveiling the path to green entrepreneurial intention. *Adm Sci.* 2023;13(10):226.
11. Abdelwahed NAA, Bastian BL, Wood BP. Women, entrepreneurship, and sustainability: the case of Saudi Arabia. *Sustainability.* 2022;14(18):11314.
12. Bandura A. Self-efficacy: toward a unifying theory of behavioral change. *Psychol Rev.* 1977;84(2):191–215.
13. Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process.* 1991;50(2):179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T).
14. Werff E, Steg L, Keizer K. It is a moral issue: the relationship between environmental self-identity, obligation-based intrinsic motivation and pro-environmental behaviour. *Glob Environ Chang.* 2013;23:1258–65.
15. Chen YS, Chang CH, Yeh SL, Cheng HI. Green shared vision and green creativity: the mediation roles of green mindfulness and green self-efficacy. *Qual Quant.* 2015;49:1169–84.
16. Ceresia F, Mendola C. Am I an entrepreneur? Entrepreneurial self-identity as an antecedent of entrepreneurial intention. *Adm Sci.* 2020;10(3):46.
17. Chen WT, Hsieh MH. Environmental self-identity, self-efficacy, and the emergence of green opinion leaders: an exploratory. *Heliyon.* 2023. <https://doi.org/10.1016/j.heliyon.2023.e17351>.
18. Akhtar S, Martins JM, Mata PN, Tian H, Naz S, Dâmaso M, Santos RS. Assessing the relationship between market orientation and green product innovation: the intervening role of green self-efficacy and moderating role of resource bricolage. *Sustainability (Switzerland).* 2021;13:1–16. <https://doi.org/10.3390/su132011494>.
19. Lauren N, Fielding KS, Smith L, Louis WR. You did, so you can and you will: Self-efficacy as a mediator of spillover from easy to more difficult pro-environmental behaviour. *J Environ Psychol.* 2016;48:191–9.
20. Celuch K, Kozlenkova I, Black G. An exploration of self-efficacy as a mediator of skill beliefs and student self-identity as a critical thinker. *Mark Educ Rev.* 2010;20(3):255–64.
21. Kim S, Yang S. The effects of Korean college students' self-identity on career decision-making self-efficacy. *Soc Behav Pers Int J.* 2019;47(9):1–6.
22. Kardoyo K, Feriady M, Farliana N, Nurkhin A. Influence of the green leadership toward environmental policies support. *J Asian Financ Econ Bus (JAFEB).* 2020;7(11):459–67.
23. Tuan ABN, Pham M. The role of mindfulness and perceived social support in promoting students' social entrepreneurial intention. *Entrep Bus Econ Rev.* 2022;10(1):145–60.
24. Cai B, Chen Y, Ayub A. "Quiet the mind, and the soul will speak"! exploring the boundary effects of green mindfulness and spiritual intelligence on University students' green entrepreneurial intention-behavior link. *Sustainability (Switzerland).* 2023;15(3895):1–21.
25. Firth AM, Cavallini I, Sütterlin S, Lugo RG. Mindfulness and self-efficacy in pain perception, stress and academic performance. The influence of mindfulness on cognitive processes. *Psychol Res Behav Manag.* 2019;12:565–74.
26. Sharma PK, Kumra R. Relationship between mindfulness, depression, anxiety and stress: mediating role of self-efficacy. *Personal Individ Differ.* 2022;186: 111363.

27. Greason PB, Cashwell CS. Mindfulness and counseling self-efficacy: the mediating role of attention and empathy. *Couns Educ Superv.* 2009;49(1):2–19.
28. Himel TH, Muniandy SL, Rahman AA. The relationship between self-efficacy, feasibility and awareness towards green entrepreneurial intention. *Sci Int (Lahore).* 2016;28(2):2095–103.
29. Hussain I, Nazir M, Hashmi SB, Shaheen I, Akram S, Waseem MA, Arshad A. Linking green and sustainable entrepreneurial intentions and social networking sites; the mediating role of self-efficacy and risk propensity. *Sustainability.* 2021;13(13):7050.
30. Chen YS, Chang CH, Lin YH. Green transformational leadership and green performance: the mediation effects of green mindfulness and green self-efficacy. *Sustainability.* 2014;6(10):6604–21.
31. Al-Mamary Y, Alshallaqi M. Impact of autonomy, innovativeness, risk-taking, proactiveness, and competitive aggressiveness on students' intention to start a new venture. *J Innov Knowl.* 2022;7:1–11.
32. Alshebami AS. Redefining resilience: the case of small entrepreneurs in Saudi Arabia. *Front Environ Sci.* 2023. <https://doi.org/10.3389/fenvs.2022.1118016>.
33. Hair JF, Ringle CM, Sarstedt M. PLS-SEM: indeed a silver bullet. *J Mark Theory Pract.* 2011;19(2):139–52.
34. Etikan I, Musa SA, Alkassim RS. Comparison of convenience sampling and purposive sampling. *Am J Theor Appl Stat.* 2015;5(1):1–5.
35. Sarstedt M, Ringle CM, Hair JF. Partial least squares structural equation modeling, handbook of market research. Cham: Springer International Publishing; 2017.
36. Fan M, Qalati SA, Khan MAS, Shah SMM, Ramzan M, Khan RS. Effects of entrepreneurial orientation on social media adoption and SME performance: the moderating role of innovation capabilities. *PLoS ONE.* 2021. <https://doi.org/10.1371/journal.pone.0247320>.
37. Fatoki O. Ethical leadership and employee in-role and extra-role green behaviour: the effects of green motivation and organisational green work climate perception. *Sustainability (Switzerland).* 2022;14:1–19.
38. Hair J, Risher J, Sarstedt M, Ringle C. When to use and how to report the results of PLS-SEM. *Eur Bus Rev.* 2019;31(1):2–24. <https://doi.org/10.1108/EBR-11-2018-0203>.
39. Fornell C, Larcker DF. Evaluating structural equation models with unobservable variables and measurement error. *J Mark Res.* 1981;18(1):39–50.
40. Podsakoff PM, MacKenzie SB, Lee J, Podsakoff NP. Common method biases in behavioral research : a critical review of the literature and recommended remedies. *J Appl Psychol.* 2003;88(5):879–903. <https://doi.org/10.1037/0021-9010.88.5.879>.
41. Henseler J, Ringle V, Sinkovics R. The use of partial least squares path modeling in international marketing. Bingley: Emerald group publishing limited; 2009.
42. Cohen J. *Statistical power analysis for the behavioral sciences.* 2nd ed. Hillsdale: Lawrence Erlbaum Associates; 1988.
43. Fallah N. Mindfulness, coping self-efficacy and foreign language anxiety: a mediation analysis. *Educ Psychol.* 2017;37(6):745–56.

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