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Assessing the influence of entrepreneurial education on individual entrepreneurial orientation of university students

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Abstract

A number of empirical studies have underscored the significance of entrepreneurial orientation in understanding the dynamic business environment driven by entrepreneurial actions. However, the notion of individual entrepreneurial orientation (IEO) has received less attention in scholarly literature. It's widely acknowledged that entrepreneurial education (EE) makes a substantial contribution to a country's economy. It's believed that EE can empower individuals and thus play a crucial role in addressing various societal challenges faced by countries globally. Nonetheless, the influence of EE on the IEO of university students, and whether it effectively guides them towards an entrepreneurial career, hasn't been thoroughly examined. This study aimed to explore the influence of EE on the IEO of university students. This study focuses on two distinct economies—a developing one (South Africa) and a developed one (Scotland), the latter being recognized for its high-quality EE and a high proportion of individuals opting for entrepreneurial careers. A quantitative research approach was followed making use of an adapted questionnaire, which was analysed with SPSS and EQS 6.4 using descriptive statistics, reliability analysis, exploratory factor analysis, multivariate analysis of variance and path model analysis. A total of 2841 questionnaires were distributed online, yielding 575 valid responses. Findings indicate that EE significantly influences the IEO of university students in South Africa, but to a lesser extent in Scotland. The study expands the existing body of knowledge on IEO of university students. In addition, it provides insight for policymakers in the respective countries.

Keywords: Entrepreneurial education, Individual entrepreneurial orientation, Entrepreneurship, South Africa, Scotland

Introduction

Socio-economic challenges such as unemployment, poverty, and crime significantly impact countries, necessitating strategies for their mitigation. Entrepreneurship has been recognized as a potential solution to these socio-economic problems, as it has been shown to stimulate economic growth (Kareem, 2015; Sall, 2022). Both developed and developing economies grapple with various social issues, but the impact is often more severe in emerging economies. For instance, South Africa's unemployment rate

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stood at 32.9% in the third quarter of 2022, a notable increase from previous quarters, likely due to the repercussions of the COVID-19 pandemic (Statistics South Africa, 2022). Furthermore, in the second quarter of 2020, South Africa experienced a 16% decrease in Gross Domestic Product (GDP), leading to an annualised growth rate of -51% for that quarter (Statistics South Africa, 2020). However, there has been a recent economic upturn following the COVID-19 pandemic, with the country's GDP growing by 0.6% in the second quarter of 2023 (Statistics South Africa, 2023). Additionally, the Gini coefficient, a measure of wealth inequality within a country, can be used to gauge a nation's economic challenges. In 2018, South Africa recorded the highest Gini coefficient globally (0.67), indicating it as the country with the most significant wealth disparity (World Bank, 2022). While social problems still exist in industrialized nations such as the United Kingdom (more especially, Scotland), these may might not be as severe as those in developing nations. A widespread social problem, unemployment affects many nations, even those with established economies. The unemployment rate in Scotland, a developed country, is 3.8% (Scottish Government, 2022), significantly lower than South Africa's figure of 31.9% (Statistics South Africa, 2023). Moreover, Scotland's unemployment rate is lower than the 4.2% national average for the United Kingdom.

It is imperative to implement Entrepreneurial Education (EE) programs to promote an environment that is favourable to entrepreneurship in both developed and developing economies. These programs foster critical entrepreneurial traits such as opportunity obsession, risk-taking, and business acumen (Din et al., 2016). Several studies have recognised a link between EE and entrepreneurial activities, which has aided in the advancement of entrepreneurship. People are inspired to pursue entrepreneurial careers by these entrepreneurial endeavours because they foster innovation and the creation of jobs (Dickson et al., 2008; McLarty, 2005; Souitaris et al., 2007; Venkateswara Rao & Pushpa Sri, 2019).

Studies have indicated that individuals between the ages of 18 and 34, falling within the 'youth' bracket, are 2.2 times more likely than people in other age groups to intend to launch their own businesses. Considering that they typically have fewer responsibilities at this point in their lives, younger people may be more willing to take risks (Bosma et al., 2019). It has also been noted that students who develop the appropriate attitudes and abilities are more inclined to pursue entrepreneurship (Robinson & Stubberud, 2014). Universities now see themselves as possible incubators of future entrepreneurs, having come to recognize these fundamental qualities and competencies of entrepreneurship. Given that students exposed to EE are more likely to consider an entrepreneurial career path, it's crucial to ascertain whether EE influences an individual's propensity towards entrepreneurship as a viable career path. Research has highlighted the importance of understanding a student's entrepreneurial inclinations and the elements that influence these tendencies (Mutlutürk & Mardikyan, 2018). This study therefore seeks to empirically assess the influence of EE on IEO of university students in a developing (South Africa) and developed (Scotland) market context, thereby providing novel insights into the relationship between various types of EE and IEO.

This article is organised as follows: first, prominent literature behind EE and IEO is unpacked. This is followed by a description of the research methods employed in this

study, as well as presentation and discussion of findings. The paper concludes with implications and recommendations for future research.

Theoretical background

An examination of the various aspects of individual entrepreneurial education and the methodologies presently employed in this field will enable scholars to evaluate the most effective strategy for guiding students towards an entrepreneurial career after their studies. Subsequent sections provide an overview of the characteristics of Individual Entrepreneurial Orientation (IEO) and the Entrepreneurial Education (EE) that university students are currently receiving.

Entrepreneurial orientation and individual entrepreneurial orientation

Entrepreneurial Orientation (EO) encapsulates the style, decisions, actions, and processes that fundamentally describe how an organisation conducts business, as well as its engagement in entrepreneurial activities (Lumpkin & Dess, 2001). It can therefore be regarded as an organisation's strategic posture. Lumpkin and Dess (1996: 136) define EO as "the processes, practices, and decision-making activities that lead to new entry as well as a propensity to act autonomously, a willingness to innovate and take risks, and a tendency to be aggressive toward competitors and proactive relative to marketplace opportunities". While this definition highlights five dimensions of EO, the dimensions used to measure EO have evolved from being unidimensional to multidimensional. Miller (1983) originally identified and described three dimensions: risk-taking, proactiveness, and innovativeness. Later, Lumpkin and Dess (1996) identified two additional dimensions: competitive aggressiveness and autonomy. **Risk-taking** can be defined as the act of pursuing bold initiatives, venturing into uncharted territories, and allocating significant resources to uncertain environments (Rauch et al., 2009). **Proactiveness** is an organisation's capacity to surpass competitors by implementing a strategic approach that ensures the introduction of new products, services, processes, and technologies into the market before competitors do (Zhai et al., 2018). **Innovativeness** refers to an organisation's capability to introduce new products, processes, technologies, and services, supported by creative processes (Yusoff et al., 2018). **Competitive aggressiveness** is an organisation's tendency to directly and intensely confront its competitors to gain entry or improve its position, with the aim of outperforming industry rivals in the marketplace (Lumpkin & Dess, 1996). Finally, **autonomy** is the ability of an individual or a team to independently bring an idea or vision to fruition (Lumpkin & Dess, 1996).

While EO is pegged at the organisational level, seeing that it refers to the strategic posture of an organisation, IEO is conceptualised at the individual level. IEO is defined as an individual's propensity to become an entrepreneur (McHenry & Welch, 2018). It is a psychological construct that helps understand why people engage in entrepreneurial actions (Kumar et al., 2021). While the EO concept at an organisational level has been explored in depth in existing literature, the individual-level measurement has gained attention, visible in a growing body of knowledge. IEO has been studied to understand individual entrepreneurial behaviours and attitudes (Koe et al., 2023; Popov et al., 2019; Sahoo & Panda, 2019; Viana et al., 2018). Recent studies have focused on the impact of IEO's on students' entrepreneurial intentions (Anwar et al., 2022; Kumar et al., 2021; Perez et al.,

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2022). Bolton and Lane (2012) developed a tool to measure IEO in students, realizing that the five dimensions of organisational-level EO could also measure individual-level EO. Moreover, studies have explored the relationship between IEO and entrepreneurial intention and found that there is a positive association between these two constructs (Ibrahim & Lucky, 2014).

To guide this study, the researchers had previously conducted a systematic review, Delphi study and qualitative study that revealed that IEO should encompass five (5) other factors, namely: emotional intelligence, entrepreneurial leadership, strategic mindset, resilience and industry/work experience. These factors thus also form part of the instrument employed in this study. These factors can be described as:

- **Emotional intelligence**: According to Salovey and Mayer (1990), emotional intelligence can be defined as an individual's capacity to regulate their own emotions as well as those of others, to influence their thoughts, actions, and decisions.
- **Entrepreneurial leadership**: This concept can be defined as a leadership style whereby the leader influences the behaviours of followers to achieve an organisational vision as well as entrepreneurial objectives by mobilising resources to generate organisational value (Gupta et al., 2004; Parente et al., 2018).
- **Strategic mindset**: Krueger and Sussan (2017: 8) have described strategic thinking as "the ability and willingness to identify, analyse, and pursue new opportunities". The connection between strategic mindset and IEO has not been thoroughly investigated, research has studied strategic mindset within the construct of entrepreneurial attitude orientation (EAO).
- **Resilience**: According to Bernard and Barbosa (2016: 89) resilience can be defined as "a form of emotional and cognitive ability that is useful for the entrepreneur, particularly when bouncing back after failures connected to their entrepreneurial initiative".
- **Industry/work experience**: Cassar (2014) outlines that industry experience can be understood as the insights and knowledge that an individual acquires within a specific organisation and its corresponding environment.

Entrepreneurial education

Over time, entrepreneurial education (EE) has garnered significant focus as a promoter of societal change. These changes are seen to manifest across social, economic and political contexts which serve as a cohesive factor which fosters individual excellence, societal cohesion and national progress (Gautam, 2015). EE introduces students to the fundamental aspects that form the foundation of entrepreneurship and ultimately inspires them to engage in entrepreneurial endeavours in the future (Mani, 2015). Studies have also shown that entrepreneurship can assist in alleviating societal challenges experienced by countries and can contribute positively to economic growth (Carree et al., 2002; Kritikos, 2014). However, a significant hurdle that exists is that many individuals are hesitant to pursue an entrepreneurial career due to the perceived high levels of risk and uncertainty (Liesch et al., 2014; Petridou et al., 2009; Sharma & Madan, 2013). Moreover, assessing the effectiveness of EE being received by students remains a significant challenge (Fatoki, 2014). Souitaris et al. (2007)

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has further found that entrepreneurial programmes are shown to increase students' intentions to pursue entrepreneurship. This study's primary focus is not on students' intentions but rather on how the EE received will influence the factors of an individual's EO.

It is also important to understand the approaches that currently exist in relation to the entrepreneurial education that currently exist. Tselepis et al. (2021) proposed a matrix that could be used to guide EE at a tertiary level. The three approaches that the authors discuss are: (a) learning about entrepreneurship; (b) learning for entrepreneurship and (c) learning through entrepreneurship.

- **Learning about entrepreneurship** (LAE) typically involves the educator presenting the theory and knowledge of entrepreneurship from a prescribed textbook and subsequently evaluating the students' knowledge through the use of assessments (Hardie et al., 2020; Ismail & Sawang, 2020; Laukkanen, 2000). This type of approach proves effective primarily in situations where the student cohort is large and there is a collective need for foundational understanding of entrepreneurial concepts and theories. Nevertheless, a challenge that exists in relation to this approach is the insufficient exposure to real-world experiences of entrepreneurs, as this approach is theoretical in nature (Crispin et al., 2013).
- **Learning for entrepreneurship** (LFE) takes an action-orientated approach which emphasises experiential learning and problem-solving over the theoretical aspects of entrepreneurship (Jones & English, 2004). This approach enhances students' creatively and effectively readies them for the real-world scenarios they may later be exposed to (O'Brien et al., 2019). Learning for entrepreneurship embraces a learning-by-doing approach which exposes students to entrepreneurship through activities such as simulations (Gibb & Price, 2014).
- **Learning through entrepreneurship** (LTE) entails the utilisation of "out-of-classroom" methods which enables students to acquire the necessary knowledge within real-life contexts, such as internships and initiating campus-based businesses (Tan & Ng, 2006). Consequently, Tselepis et al. (2021) asserts that LTE revolves around affording students the opportunity for real-world practice and learning.

Additionally, scholars have described two distinct approaches that are used to instruct entrepreneurship: (a) the traditional approach which deals with students' being introduced to entrepreneurship via lectures and seminars and (b) the non-traditional approach which is characterised by more action-oriented teachings which are aimed at enhancing the student's creativity and thinking skills (Mwasalwiba, 2010; Tasnim & Yahya, 2013). These action-oriented techniques include computer simulations or practical experience in an established organisation which facilitates the development of a students' decision-making abilities (Balan, 2014; Solomon, 2007). On a global scale, universities are therefore under pressure to reform the delivery of EE as the traditional approaches currently being utilised are perceived as inadequate in effectively fostering entrepreneurship. These traditional approaches equip students to work for entrepreneurs in the future, rather than empower them to become entrepreneurs themselves. To effectively address this challenge, the traditional approach

should be adapted to incorporate practical experiences which will prepare students with both essential knowledge and skills (Fatoki, 2014).

Research methodology

This study made use of a quantitative research design through the use of an adapted questionnaire. A quantitative research approach was deemed most appropriate as the purpose of the study was to empirically assess the influence of three different types of Entrepreneurship Education on the Individual Entrepreneurial Orientation (IEO) of university students in South Africa and Scotland. A conceptual model was developed to evaluate IEO and EE. As previously noted, curricula in higher education need to be adapted to include both the theory and practice-based teaching methods. The learning about, learning for, and learning through entrepreneurship approaches encompass both theoretical and practical methodologies. Hence, based on the reviewed literature, they are regarded as suitable approaches consistent with EE. Additionally, in relation to IEO, the researcher identified ten factors that need to be considered, which emerged during the development of the conceptual model. These factors were derived from a multi-stage study that included a Delphi study, a systematic review, and qualitative study, all of which contributed to identifying the additional IEO factors (Amaral et al., 2023; Teles et al., 2021). While the identified new IEO dimensions differ from the commonly used dimensions of risk-taking, innovation and proactiveness, an expanded view of the IEO concept is offered from the perspective of a student body in higher education institutions. The hypothesised relationships can be seen in Fig. 1.

The hypotheses for the IEO factors are therefore formulated as follows:

- H1: Entrepreneurial education has a positive influence on industry/work experience.
- H2: Entrepreneurial education has a positive influence on autonomy.
- H3: Entrepreneurial education has a positive influence on innovativeness.
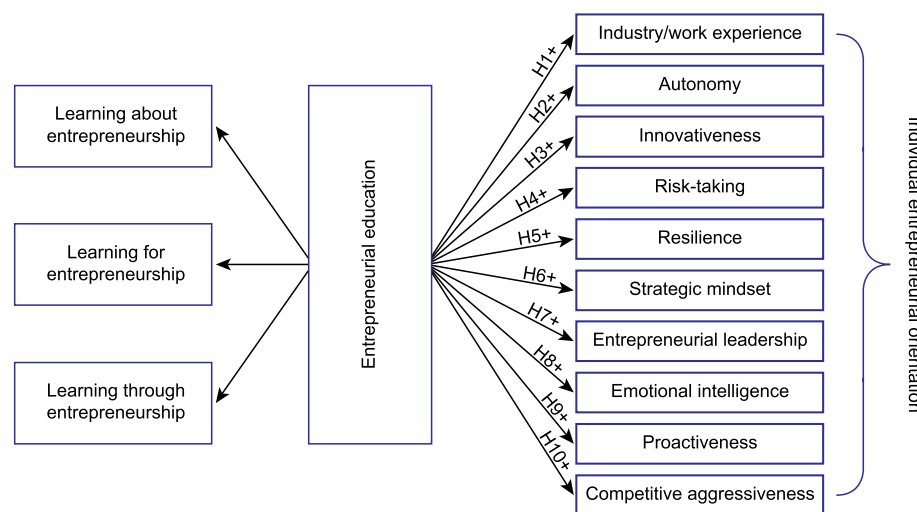- H4: Entrepreneurial education has a positive influence on risk-taking.

Fig. 1 Integrated conceptual framework

- H5: Entrepreneurial education has a positive influence on resilience.
- H6: Entrepreneurial education has a positive influence on strategic mindset.
- H7: Entrepreneurial education has a positive influence on entrepreneurial leadership.
- H8: Entrepreneurial education has a positive influence on emotional intelligence.
- H9: Entrepreneurial education has a positive influence on proactiveness.
- H10: Entrepreneurial education has a positive influence on competitive aggressiveness.

Blumberg et al. (2014) suggest a minimum sample size that is at least five times the number of items in the instrument. In the context of this study, the instrument comprises 74 items, thereby setting the minimum sample size at 370 responses. The study employed a probability sampling method by means of simple random sampling, thereby providing "each member of the population has an equal chance of being selected for the study" (Bryman & Bell, 2014: 146). The inclusion criteria for the study were set as follows: (i) respondents could be of any race, gender, or age; (ii) respondents must have studied at a tertiary institution in South Africa or Scotland; and (iii) respondents must have been exposed to Entrepreneurial Education (EE) at a tertiary institution. The exclusion criteria ruled out respondents who (i) did not study at a tertiary institution in South Africa or Scotland and/or (ii) had no exposure to EE at a tertiary institution. Owing to the data being collected across two countries, the questionnaire was self-administered online by means of Google Forms. The link to the questionnaire was sent to a total of 2841 potential respondents from various institutions in South Africa and Scotland who met the inclusion criteria. A total of 575 questionnaires were completed, thereby yielding a response rate of 20.2%.

The adapted measuring instrument contained three sections. Section A elicited demographic information from the respondents, such as their gender, age, country of study and the highest qualification or the level of qualification for which they were currently registered. Section B contained questions on the three approaches to EE, and Section C contained questions regarding the ten factors used to measure IEO. The questionnaire consisted of closed-ended, multiple-choice questions measured on a 5-point Likert scale. The questionnaire was pre-tested on 30 individuals (15 South African; 15 Scottish) to ensure the validity and reliability of the instrument.. Pre-testing the questionnaire would have ensured that any internal threats be accounted for and adjusted immediately, prior to the actual data collection being conducted. The sources for the adapted questionnaire are depicted in Table 1.

Data were analysed by means of SPSS (Version 25) and EQS 6.4. The data-analysis techniques that were employed in the study included reliability analysis, correlation analysis, MANOVA and path model analysis.

In terms of ethical considerations, the study followed the ethical guidelines as prescribed by the relevant university ethics committee. These ethical considerations entailed briefing participants in writing on their rights such as privacy, confidentiality, and consent. The objectives of the research and the researchers' intentions were explained through a cover letter, with participants reserving the option to withdraw at any time. No incentives were offered for completion of the survey. Ethical clearance

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Table 1 Construction of the measuring instrument

Section	Construct	Source
Entrepreneurial education	Learning through entrepreneurship	Seikkula-Leino et al. (2014)
	Learning about entrepreneurship	
	Learning for entrepreneurship	
Individual Entrepreneurial Orientation	Risk-taking	Bolton and Lane (2012); Taatila and Down (2012)
	Innovativeness	Bolton and Lane (2012); Taatila and Down (2012)
	Proactiveness	Bolton and Lane (2012); Taatila and Down (2012)
	Autonomy	Koloba (2016)
	Competitive aggressiveness	Balafoutas et al. (2023)
	Emotional intelligence	Wen et al. (2020)
	Entrepreneurial leadership	Rehm and Selznick (2019)
	Strategic mindset	Own compilation
	Resilience	Fisher et al. (2016)
	Industry/work experience	Bignotti and Roux (2020); Miralles et al. (2016)

for the study, under code 23SOM/BM02, was obtained from the College of Business and Economics ethics committee at the University of Johannesburg.

Results and discussion

The questionnaire measured three constructs in relation to EE: (1) learning through entrepreneurship, (2) learning about entrepreneurship and (3) learning for entrepreneurship. The questionnaire then measured IEO through ten constructs, namely: (1) risk-taking, (2) innovativeness, (3) proactiveness, (4) autonomy, (5) competitive aggressiveness, (6) emotional intelligence, (7) entrepreneurial leadership, (8) strategic mindset, (9) resilience and (10) industry/ work experience. The items for each construct were developed based on an extensive literature search.

The KMO measure of sampling adequacy was used to "quantify the degree of intercorrelations among variables" (Hair et al., 2010: 104). The KMO measure of sampling adequacy was conducted for EE and IEO. The recorded KMO value for EE was 0.931, which is regarded as excellent, as per the ranking by Kaiser (1974). Furthermore, the recorded KMO value for IEO was 0.940, which again can be classified as excellent, according to Kaiser (1974). Furthermore, Bartlett (1937: 268) states that the test of sphericity measures that "equality exists amongst variances across groups, against the alternative that variances are unequal for at least two groups". The significance of Bartlett's test of sphericity for EE and IEO were both 0.000, indicating that EFA could be performed, in line with Kaiser's suggestions (Kaiser, 1974). As art of the EFA, a cumulative percentage is often presented to indicate how much of the variance is explained by which factors from the research and it is expressed as a percentage of variance before and after rotation. Considering the total variance explained in relation to EE, three factors were extracted as they had eigenvalues greater than 1, cumulatively explaining a variance of 66.21% before rotation, and 68.76% after rotation. With regard to the IEO construct, 11 factors had eigenvalues greater then 1, cumulatively explaining a variance of 62.46% before rotation and 54.67% after rotation. Next, a rotated factor matrix was used to simplify the interpretation of the items that predict the underlying factors (Hair et al., 2014). Principal Axis Factoring (PAF) was used as the chosen extraction method with the varimax

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with Kaiser normalisation. This was done for researchers to understand the covariation among the study's variables. According to Pallant (2020), values below 0.3 indicate that there is a satisfactory fit of all items in the construct. Upon conducting the rotated factor matrix, the researcher found that there were some constructs that split and other constructs that could be joined. For EE, it was observed that all items loaded in alignment with the conceptual model proposed for the study. For IEO, it was observed that the majority of items loaded in accordance with the conceptual model proposed for the study. Specifically, factors such as industry/work experience, autonomy, resilience, entrepreneurial leadership, proactiveness, and competitive aggressiveness demonstrated clear alignment with their respective constructs. However, there were exceptions in the factor loading patterns. First, risk-taking and innovativeness emerged as a combined construct, suggesting a potential overlap or interrelation between these items within the context of IEO. Additionally, the strategic mindset factor encountered a challenge, as one item had to be removed due to misalignment with the intended construct. Furthermore, upon closer analysis, the emotional intelligence factor exhibited a split into two distinct factors: empathy and self-efficacy.

To assess the internal consistency of the constructs, Cronbach's alpha test was applied. According to Pallant (2020) a Cronbach's alpha of above 0.7 is usually regarded as good internal consistency. Cronbach's alpha is influenced by the number of items within a scale, especially when the scale consists of fewer than ten items, resulting in frequently observed low coefficients (around 0.5). When a scale contains fewer than ten items, it is advisable to report the mean inter-item correlation, with a desirable mean inter-item correlation being around 0.2 (Briggs & Cheek, 1986; Pallant, 2020). As indicated in Table 2, all alpha values for the constructs were above 0.7, indicating good internal consistency. Due to the competitive aggressiveness subscale consisting of only six items, a slightly lower Cronbach's alpha of 0.655 was recorded.

Table 2 Pre-EFA reliability analysis (EE and IEO)

Construct	Cronbach's Alpha	Number of items	Mean inter-item correlation
Entrepreneurial education			
Learning through entrepreneurship	0.852	6	0.493
Learning for entrepreneurship	0.879	5	0.593
Learning about entrepreneurship	0.811	5	0.464
Individual entrepreneurial orientation			
Risk-taking	0.731	6	0.312
Innovativeness	0.769	6	0.357
Proactiveness	0.770	6	0.363
Autonomy	0.925	6	0.676
Competitive aggressiveness	0.655	6	0.248
Emotional intelligence	0.763	6	0.350
Entrepreneurial leadership	0.909	5	0.668
Strategic mindset	0.845	5	0.523
Resilience	0.800	6	0.409
Industry/work experience	0.920	6	0.675

Table 3 Post-EFA reliability analysis (EE and IEO)

| Construct	Cronbach's Alpha	Number of items	Mean inter-item correlation
Entrepreneurial education			
Learning through entrepreneurship	0.885	7	0.529
Learning for entrepreneurship	0.879	5	0.593
Learning about entrepreneurship	0.846	4	0.580
Individual Entrepreneurial Orientation			
Industry/work experience	0.920	6	0.675
Autonomy	0.925	6	0.676
Innovation and risk-taking	0.850	12	N/A
Resilience	0.800	6	0.409
Strategic mindset	0.836	6	0.459
Removal of item R4	0.845	5	0.419
Entrepreneurial leadership	0.909	5	0.668
Empathy	0.812	3	0.599
Proactiveness	0.746	4	0.423
Competitive aggressiveness	0.731	3	0.470
Self-efficacy	0.742	4	0.421
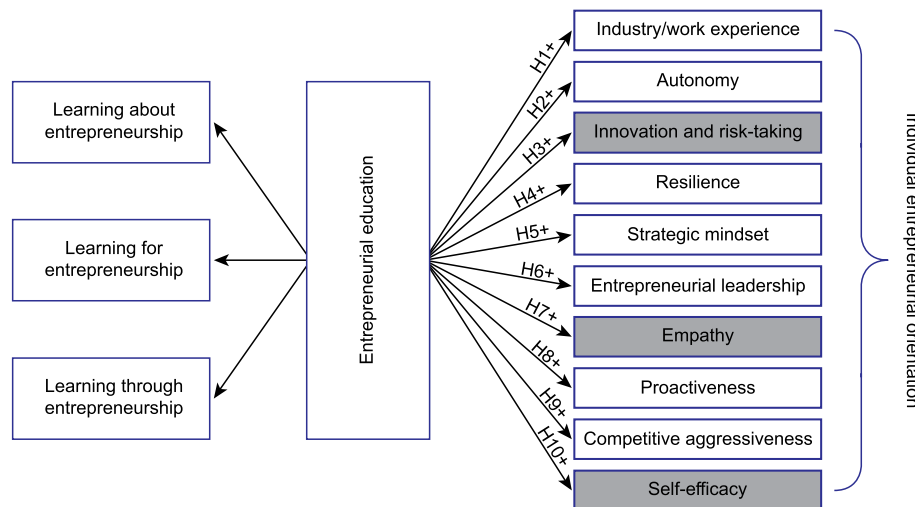
Fig. 2 Integrated conceptual framework (post-EFA)

Consequently, mean inter-item correlation values were computed for this subscale. Table 2 shows the pre-EFA reliability analysis (original factors).

Table 3 indicates the post-EFA reliability analysis.

Figure 2 presents the updated model that indicates these novel constructs. The factors that have been shaded are the factors that were modified as a result of the EFA. The factors that were modified were H3, H7 and H10. H3 indicates the merging of the innovativeness (originally H3) and risk-taking (originally H4) factors, as proposed in the original model. H7 and H10 indicate the splitting of the emotional intelligence factor (originally H8), as proposed in the original model.

The following are the updated hypotheses in relation to the model above and after EFA has been conducted:

- H1: Entrepreneurial education has a positive influence on industry/work experience.
- H2: Entrepreneurial education has a positive influence on autonomy.
- H3: Entrepreneurial education has a positive influence on innovation and risk-taking.
- H4: Entrepreneurial education has a positive influence on resilience.
- H5: Entrepreneurial education has a positive influence on strategic mindset.
- H6: Entrepreneurial education has a positive influence on entrepreneurial leadership.
- H7: Entrepreneurial education has a positive influence on empathy.
- H8: Entrepreneurial education has a positive influence on proactiveness.
- H9: Entrepreneurial education has a positive influence on competitive aggressiveness.
- H10: Entrepreneurial education has a positive influence on self-efficacy

The study then employed a Multivariate Analysis of Variance (MANOVA). MANOVA is regarded as a statistical method that evaluates whether there are significant differences among multiple groups across several dependent variables simultaneously. This approach examines the statistical significance of the relationships between one or more independent variables and a set of two or more dependent variables (Weinfurt, 1995). MANOVA entails several assumptions that can be tested, encompassing univariate normality, multivariate normality, and linearity (Pallant, 2020). Table 4 indicates the test of normality.

Before conducting data analysis, it was essential to perform normality assessments to verify that the assumptions of each variable, as well as its linear combinations, follow a normal distribution. Key tests for assessing normality include the Kolmogorov–Smirnov test, the Shapiro–Wilk test, the D'Agostino skewness test, and the Anscombe–Glynn kurtosis test (Öztuna et al., 2006). The Kolmogorov–Smirnov test is preferable for smaller sample sizes whilst the Shapiro–Wilk test is better suited for sample sizes exceeding 50. In this study, the Kolmogorov–Smirnov test of normality was utilised. This test was conducted separately for each variable in each country, revealing that all p values were below 0.05, indicating non-normal distribution of the data (Pallant, 2020). This deviation from normality may be attributed to the use of Likert scales in data collection and is commonly observed in larger samples (Pallant, 2020; Preston & Colman, 2000). However, it is noted that when a study has a sufficiently large sample size (exceeding 30 or 40), the violation of normality assumption is unlikely to pose significant issues (Ghasemi & Zahediasl, 2012; Pallant, 2020). Table 5 indicates the multivariate test of normality.

To initiate the assessment for multivariate normality, it is crucial to first conduct the Mahalanobis distance (D^2) technique to identify any outliers within the data set. Mahalanobis distance is defined by Tabachnick and Fidell (2013) as the distance between a specific case and the centroid of the remaining cases in the data set. Regarding this technique, large D^2 values accompanied by small corresponding p values ($p < 0.01$) suggest the potential presence of outliers (Hair et al., 2010). Identifying outliers entails

Table 4 Test of normality

Construct	Country	Kolmogorov–Smirnov[a]		
		Statistic	*df*	**Sig.**
Entrepreneurial education	South Africa	0.051	355	0.026
	Scotland	0.141	220	0.000
Factor 1: Industry/work experience	South Africa	0.107	355	0.000
	Scotland	0.139	220	0.000
Factor 2: Autonomy	South Africa	0.188	355	0.000
	Scotland	0.161	220	0.000
Factor 3: Innovation and risk-taking	South Africa	0.056	355	0.009
	Scotland	0.096	220	0.000
Factor 4: Resilience factor	South Africa	0.084	355	0.000
	Scotland	0.092	220	0.000
Factor 5: Strategic mindset	South Africa	0.073	355	0.000
	Scotland	0.134	220	0.000
Factor 6: Entrepreneurial leadership	South Africa	0.126	355	0.000
	Scotland	0.165	220	0.000
Factor 7: Empathy	South Africa	0.149	355	0.000
	Scotland	0.170	220	0.000
Factor 8: Proactiveness	South Africa	0.122	355	0.000
	Scotland	0.164	220	0.000
Factor 9: Competitive aggressiveness	South Africa	0.141	355	0.000
	Scotland	0.132	220	0.000
Factor 10: Self-efficacy	South Africa	0.142	355	0.000
	Scotland	0.156	220	0.000

[a] Lilliefors Significance Correction

Table 5 Multivariate test of normality

	Minimum	Maximum	Mean	*SD*
Predicted value	60.79	493.31	288.00	101.170
Standard predicted value	− 2.246	2.029	0.000	1.000
Standard error of predicted value	8.805	40.128	18.511	5.183
Adjusted predicted value	21.76	493.90	288.02	101.531
Residual	− 386.343	493.209	0.000	131.775
Standard Residual	− 2.904	3.707	0.000	0.990
Studentized residual	− 2.924	3.851	0.000	1.001
Deleted residual	− 391.769	532.241	− 0.018	134.759
Studentized deleted residuals	− 2.944	3.899	0.000	1.003
Mahalanobis distance	1.515	**51.209**	10.981	7.361
Cook's distance	0.000	0.098	0.002	0.005
Centred leverage value	0.003	0.089	0.019	0.013

N = 575 (South Africa and Scotland)

comparing the Mahalanobis distance to a critical value, determined using a chi-square table as outlined by Pallant (2020), with degrees of freedom (*df*) indicating the number of dependent variables. In the present study, considering 11 dependent variables (i.e., 10 IEO factors and EE), the critical value was determined to be 31.26 following guidelines by Tabachnick and Fidell (2013). Subsequently, the Mahalanobis distance test was

conducted, with degrees of freedom corresponding to the number of items analysed. As indicated in Table 5, the Mahalanobis distance value exceeded the critical value of 31.26 by displaying a maximum value of 51.209, signifying the presence of multivariate outliers. Consequently, 15 cases were confirmed as outliers and removed from the analysis. Furthermore, Pallant (2020) suggests evaluating the matrix of scatterplots and correlations to examine linearity. MANOVA is most effective when the dependent variables are moderately correlated. The scatterplots that were analysed by the researchers exhibited no evident indications of non-linearity, suggesting that most relationships are linear and thus appropriate for correlation analyses.

Pallant (2020) emphasises the importance of examining correlations among dependent variables, as excessively high or low correlations can raise concerns. For MANOVA to be valid, the majority of dependent variables should demonstrate moderate correlations. If most correlation values exceed 0.8, it suggests overly high correlations among the dependent variables (Pallant, 2020). Upon analysis, it was observed that the majority of variables exhibit moderate correlations, falling within the range of 0.3 to 0.8. Therefore, it is reasonable to conclude that MANOVA can be conducted for this study.

Additionally, the researcher conducted Box's test to assess whether the data adhered to the assumption of homogeneity of variance–covariance matrices (Pallant, 2020). Upon further analysis, the data violates this assumption, as the p value is below 0.05 (Pallant, 2020), suggesting unequal variances between the two groups (i.e., South Africa and Scotland). Nonetheless, Tabachnick and Fidell (2013) caution that Box's test may be overly stringent, particularly with data from a sizable sample size. Hence, the breach of this assumption is attributed to the large sample size. Table 6 indicates the results for Levene's test of equality of error variances.

The researcher proceeded to conduct Levene's test of equality of error variances to ascertain whether variances remained consistent across groups (Pallant, 2020). Table 6 reveals instances where certain variables violate the assumption of error variances, indicating disparities across groups (i.e., South Africa and Scotland). According to Levene's test, when the p value falls below 0.05 for a variable, it indicates unequal variances of the dependent variable across groups (Pallant, 2020). Given the non-normal distribution of the data, the researcher opted to report median scores. Table 6 illustrates instances where $p > 0.05$ for EE ($p = 0.075$), autonomy ($p = 0.067$), innovation and risk-taking ($p = 0.138$), and competitive aggressiveness ($p = 0.114$), suggesting equal variances among the groups. However, variables such as industry/work experience, resilience, strategic mindset, entrepreneurial leadership, empathy, proactiveness, and self-efficacy violate the assumption of equal variances, as indicated by p values less than 0.05.

Subsequently, multivariate tests were conducted to determine whether statistically significant differences existed among the groups concerning a linear combination of the dependent variables (Pallant, 2020: 312). Despite some assumption violations, Pallant (2020) suggests that the large sample size mitigates potential issues. Therefore, employing Pillai's trace is recommended for its robustness compared to other multivariate tests like Wilks' lambda (Tabachnick & Fidell, 2013). Table 7 presents the multivariate test conducted for this study.

Pallant (2020) emphasises that a p value less than 0.05 signifies a statistically significant difference among tested groups. Acknowledging some variables in Levene's

Table 6 Levene's test of equality of error variances

	Levene statistic	*df*1	*df*2	Sig.
Entrepreneurial education				
Based on median	3.182	1	558	0.075
Based on median and with adjusted *df*	3.182	1	546.660	0.075
Factor 1: Industry/work experience				
Based on median	38.515	1	558	0.000
Based on median and with adjusted *df*	38.515	1	556.334	0.000
Factor 2: Autonomy				
Based on median	3.356	1	558	0.067
Based on median and with adjusted *df*	3.356	1	501.883	0.068
Factor 3: Innovation and Risk-taking				
Based on median	2.204	1	558	0.138
Based on median and with adjusted *df*	2.204	1	557.463	0.138
Factor 4: Resilience Factor				
Based on median	34.876	1	558	0.000
Based on median and with adjusted *df*	34.876	1	513.791	0.000
Factor 5: Strategic Mindset				
Based on median	43.322	1	558	0.000
Based on median and with adjusted *df*	43.322	1	510.193	0.000
Factor 6: Entrepreneurial Leadership				
Based on median	39.776	1	558	0.000
Based on median and with adjusted *df*	39.776	1	491.102	0.000
Factor 7: Empathy				
Based on median	13.666	1	558	0.000
Based on median and with adjusted *df*	13.666	1	557.000	0.000
Factor 8: Proactiveness				
Based on median	42.585	1	558	0.000
Based on median and with adjusted *df*	42.585	1	491.566	0.000
Factor 9: Competitive Aggressiveness				
Based on median	2.501	1	558	0.114
Based on median and with adjusted *df*	2.501	1	557.976	0.114
Factor 10: Self-efficacy				
Based on median	26.364	1	558	0.000
Based on median and with adjusted *df*	26.364	1	542.706	0.000

Tests the null hypothesis that the error variance of the dependent variable is equal across groups

Table 7 Multivariate tests

Multivariate tests						
Effect	Value	*F*	Hypothesis *df*	Error *df*	Sig.	Partial eta squared
Pillai's trace	**0.475**	45,140	11.000	548.000	**0.000**	0.475
Wilks' lambda	0.525	45,140	11.000	548.000	0.000	0.475
Hotelling's trace	0.906	45,140	11.000	548.000	0.000	0.475
Roy's largest root	0.906	45,140	11.000	548.000	0.000	0.475

test violating the assumption of equal variances, the researcher applied a suggestion by Tabachnick and Fidell (2013) to set a stricter *p* value (0.025 or 0.01) to confirm the statistical significance. Opting for a stricter threshold of 0.01, rather than the conventional 0.05, ensured robustness in the analysis. As illustrated in Table 7, the study yielded a Pillai's trace value of 0.475, with a significance (*p* value) of 0.000, affirming a significant difference between South Africa and Scotland regarding how EE influences IEO. The closer Pillai's trace value is to 1, the stronger the evidence. In this study, Pillai's trace value was 0.475, indicating moderate strength. Upon obtaining a significant result in the multivariate test, Pallant (2020) advocates for further exploration to identify significant differences between each variable. Given multiple analyses, Pallant (2020) suggests setting a higher significance level to minimize Type 1 errors, which occur when a significant result is obtained erroneously. To achieve this, the Bonferroni adjustment is recommended, involving dividing the original *p* value of 0.05 by the number of dependent variables in the study (i.e., 11 variables). Consequently, the significance level for the study becomes $0.05/11 = 0.0045$. Thus, a result is deemed significant only if the significance value (Sig.) falls below 0.0045. Table 8 displays the outcomes of the tests of between-subject effects.

Table 8 illustrates that seven dependent variables exhibit a significant difference between South Africa and Scotland: EE, industry/work experience, resilience, strategic mindset, entrepreneurial leadership, proactiveness, and self-efficacy. These variables all yield a *p* value below 0.0045 (adjusted significance level). While this disparity is significant, understanding the effect size is crucial, as it indicates the magnitude of this difference. Pallant (2020) explains that effect size measures the relative strength of the statistical difference and commonly employs statistics such as partial eta squared and Cohen's *d*. The study utilises Cohen's (1988) guidelines for interpreting effect size, categorising it as small (0.01), medium (0.06), or large (0.14). Initially designed for eta squared, these guidelines are equally applicable for interpreting partial eta squared (Pallant, 2020). EE, industry/work experience, strategic mindset exceed 0.14 and therefore have a large effect size. Resilience has a medium effect

Table 8 Tests of between-subject effects (post-hoc test)

Tests of between-subjects effects

Source	Type III sum of squares	*df*	Mean squared	*F*	Sig.	Partial eta squared
Entrepreneurial education	108.184	1	108.184	163.744	**0.000**	**0.227**
Factor 1: Industry/work experience	330.521	1	330.521	321.659	**0.000**	**0.366**
Factor 2: Autonomy	0.593	1	0.593	0.718	0.397	0.001
Factor 3: Innovation and risk-taking	1.164	1	1.164	3.405	0.066	0.006
Factor 4: Resilience	14.605	1	14.605	39.745	**0.000**	**0.066**
Factor 5: Strategic mindset	47.537	1	47.537	103.085	**0.000**	**0.156**
Factor 6: Entrepreneurial leadership	15.153	1	15.153	27.438	**0.000**	**0.047**
Factor 7: Empathy	0.336	1	0.336	0.555	0.457	0.001
Factor 8: Proactiveness	35.294	1	35.294	81.374	**0.000**	**0.127**
Factor 9: Competitive aggressiveness	0.373	1	0.373	0.512	0.475	0.001
Factor 10: Self-efficacy	4.815	1	4.815	14.418	**0.000**	**0.025**

size at 0.127. Entrepreneurial leadership, proactiveness and self-efficacy have a small effect size as they exceed the value for a small effect size.

Notably, there is a substantial variance in entrepreneurial education (EE) practices between the two countries, with a significance value of 0.000, denoting a large effect size (partial eta squared of 0.227). This implies a considerable difference in EE implementation. Similarly, significant distinctions exist in industry/work experience, resilience, strategic mindset, entrepreneurial leadership, and proactiveness, as indicated by significance values below 0.0045 and corresponding large effect sizes. However, autonomy, innovation and risk-taking, empathy, and competitive aggressiveness show no statistically significant differences. Self-efficacy displays a small but significant discrepancy between the two countries.

The researchers initially put forth 10 research hypotheses outlining the anticipated relationships among research constructs. However, following the exploratory factor analysis (EFA), a revised model corresponding research hypotheses were developed based on the updated factor loadings. These refined research hypotheses are discussed in this section. Path model analysis was then conducted using EQS 6.4 to examine these relationships, with the results presented in the subsequent section. The ensuing discussions elaborate on the nuanced relationships between entrepreneurial education (EE) and individual entrepreneurial orientation (IEO) factors. Notably, these relationships vary between the two studied countries, South Africa and Scotland. Both sets of findings are presented below to offer insights into how EE influences IEO within distinct contexts. Table 9 provides an overview of the acceptance or rejection of the hypothesised relationships for each country.

Table 9 Hypothesised relationships

Hypothesis	Decision (based on *p* value) South Africa	Decision (based on *p* value) Scotland
H1 +: Entrepreneurial education has a positive influence on industry/work experience	Accepted	Rejected
H2 +: Entrepreneurial education has a positive influence on autonomy	Accepted	Accepted
H3 +: Entrepreneurial education has a positive influence on innovation and risk-taking	Accepted	Rejected
H4 +: Entrepreneurial education has a positive influence on resilience	Accepted	Accepted
H5 +: Entrepreneurial education has a positive influence on strategic mindset	Accepted	Accepted
H6 +: Entrepreneurial education has a positive influence on entrepreneurial leadership	Accepted	Rejected
H7 +: Entrepreneurial education has a positive influence on empathy	Accepted	Rejected
H8 +: Entrepreneurial education has a positive influence on proactiveness	Accepted	Accepted
H9 +: Entrepreneurial education has a positive influence on competitive aggressiveness	Rejected	Rejected
H10 +: Entrepreneurial education has a positive influence on self-efficacy	Accepted	Rejected

H1 + : Entrepreneurial education has a positive influence on industry/work experience

The analysis demonstrates a significant positive relationship ($p < 0.05$) between entrepreneurial education (EE) and industry/work experience (IWE) in South Africa, supporting hypothesis H1. Conversely, in Scotland, no significant relationship between EE and IWE is observed ($p > 0.05$), leading to the acceptance of the null hypothesis, indicating that EE does not impact IWE in Scotland. According to existing literature, Scotland, being a developed country, offers individuals exposure to industry experiences through avenues beyond formal education. Access to established networks and professional associations provides ample opportunities for learning from experienced professionals, reducing reliance on formal education alone (Stam, 2015). This differs starkly from the situation in South Africa, where individuals, particularly the youth, face challenges in securing employment due to economic constraints.

H2 + : Entrepreneurial education has a positive influence on autonomy

The analysis of path models and corresponding p values revealed a positive relationship ($p < 0.05$) between entrepreneurial education (EE) and autonomy in both South Africa and Scotland. This significant finding supports hypothesis H2, indicating that EE has a substantial and positive influence on autonomy in both contexts. This notable relationship aligns with existing literature suggesting that educational initiatives fostering self-confidence, empowerment, and independence are essential for individuals to exercise autonomy. Consequently, autonomy is considered a fundamental aspect of entrepreneurial education (EE) (Baggen et al., 2021; van Gelderen, 2010). Interestingly, this discovery contrasts with the findings of a seminal study by Bolton and Lane (2012), which suggested weak associations between autonomy and entrepreneurial orientation (IEO), positing that individuals would naturally develop autonomy as they mature.

H3 + : Entrepreneurial education has a positive influence on innovation and risk-taking

An analysis of the path models and associated p values revealed a significant positive relationship between entrepreneurial education (EE) and innovation and risk-taking in South Africa, leading to the rejection of the null hypothesis ($p < 0.05$) as hypothesised (H3). Conversely, no significant relationship was found between EE and innovation and risk-taking in Scotland ($p > 0.05$), supporting the acceptance of the null hypothesis, indicating that EE does not influence innovation and risk-taking in the Scottish context. There could be several explanations for why entrepreneurial education (EE) might not significantly impact an individual's inclination towards innovation and risk-taking in the context of Scotland, a developed country. Developed nations often have cultural and institutional settings that inherently promote innovation and risk-taking (Acs et al., 2005), suggesting that individuals may already possess a natural inclination towards such endeavours without relying on EE. Additionally, developed countries typically have more stable economies compared to their developing counterparts.

H4 + : Entrepreneurial education has a positive influence on resilience

The path model analysis and associated p values revealed a significant positive relationship between entrepreneurial education (EE) and resilience in both South Africa and Scotland ($p < 0.05$). This significant finding supports the rejection of the null hypothesis,

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indicating that EE indeed exerts a positive and substantial influence on resilience in both contexts, as hypothesised (H4). This discovery aligns with existing literature emphasising the importance of resilience as a crucial trait among entrepreneurs, suggesting that exposure to EE can enhance an individual's resilience (Wang et al., 2023a, 2023b). Studies by Cui (2021) and Wahid et al. (2016) further support this notion, demonstrating a positive and significant impact of various forms of EE on resilience. Moreover, EE has been shown to provide students with essential competencies to bolster their resilience, enabling them to navigate and adapt to adversity, uncertainty, and change effectively (Bullough & Renko, 2013; González-López et al., 2019; Hardie et al., 2020).

H5 + : Entrepreneurial education has a positive influence on strategic mindset

The analysis of path models and associated p values revealed a positive correlation between entrepreneurial education (EE) and strategic mindset in both South Africa and Scotland ($p < 0.05$). This significant finding provides strong evidence to reject the null hypothesis, affirming that EE exerts a positive and significant influence on strategic mindset in both contexts, as hypothesised (H5). This discovery is consistent with existing research. Stonkutė (2022) found a notable positive relationship between a strategic thinking mindset and EE, suggesting the importance of integrating strategic-thinking courses into EE programs to foster this mindset further. Moreover, prior studies have emphasized the necessity of a strategic-thinking mindset for nurturing entrepreneurship and leveraging diverse opportunities (Dhliwayo & Van Vuuren, 2007; Zahra & Nambisan, 2012).

H6 + : Entrepreneurial education has a positive influence on entrepreneurial leadership

The analysis of path models revealed a significant positive relationship ($p < 0.05$) between entrepreneurial education (EE) and entrepreneurial leadership in South Africa, supporting hypothesis H6. However, no significant relationship was found between EE and entrepreneurial leadership in Scotland, with a p value of 0.06 ($p > 0.05$), leading to the acceptance of the null hypothesis and indicating that EE does not impact entrepreneurial leadership in the Scottish context. The findings are consistent with existing literature, which suggests that developed nations prioritise enhancing framework conditions through advanced innovation, while developing nations prioritise strengthening the entrepreneurial environment by enhancing management skills (Acs, 2006; Harrison et al., 2018). This implies that entrepreneurial leadership holds greater significance for developing countries like South Africa. Moreover, there is a heightened focus on EE in developing nations to emphasise the importance of leadership (Morakinyo & Akinsola, 2019). Conversely, individuals in developed countries like Scotland may acquire leadership competencies at an earlier stage due to their stable economic environments, potentially reducing the need for formal education in leadership concepts.

H7 + : Entrepreneurial education has a positive influence on empathy

The analysis revealed a significant positive relationship ($p < 0.05$) between EE and empathy in South Africa, supporting hypothesis H7. This finding rejects the null hypothesis, indicating that EE significantly influences empathy in the South African context. Conversely, no significant relationship was found between EE and empathy in Scotland

($p = 0.137$, $p > 0.05$), leading to the acceptance of the null hypothesis, suggesting that EE does not influence empathy in the Scottish context. Wang et al. (2023b) discovered that individuals are influenced by factors such as culture, religion, and social structure within their communities, facilitating the development of cross-cultural connections. Moreover, people from collectivistic cultures tend to exhibit greater empathy toward others' well-being, as it often aligns with their own (Chopik et al., 2017; Kitayama et al., 2000). In a culturally diverse nation like South Africa, individuals demonstrate heightened empathy toward each other, consistent with the outcomes of the current research.

H8 + : Entrepreneurial education has a positive influence on proactiveness

The analysis of path models and corresponding p values revealed a significant positive relationship between entrepreneurial education (EE) and proactiveness in both South Africa and Scotland ($p < 0.05$). This finding supports hypothesis H8, indicating that EE significantly influences proactiveness in both contexts. This discovery aligns with existing literature indicating that individuals engaged in entrepreneurial endeavours tend to foresee challenges and recognize opportunities more effectively (Sienatra & Sienatra, 2020). Additionally, several studies have emphasised the role of education in augmenting individuals' proactiveness, thereby fostering their inclination towards entrepreneurship (Adu et al., 2020; Delle & Amadu, 2016; Vantilborgh et al., 2015).

H9 + : Entrepreneurial education has a positive influence on competitive aggressiveness

The analysis of path models and associated p values revealed no significant relationship ($p > 0.05$) between entrepreneurial education (EE) and competitive aggressiveness in both South Africa and Scotland. With reported p values of 0.198 for South Africa and 0.735 for Scotland, there was no statistically significant association found between these factors. This supports the acceptance of the null hypothesis, indicating that EE does not impact competitive aggressiveness in either the South African or Scottish context. These results align with the seminal study by Bolton and Lane (2012), which identified competitive aggressiveness as a factor with low Cronbach's alpha and thus removed due to inadequate empirical validation. Despite competitive aggressiveness demonstrating an acceptable Cronbach's alpha in our study, the findings still indicate that entrepreneurial education (EE) does not influence competitive aggressiveness in either country. Bolton and Lane (2012) suggest that this trait may develop over time, particularly when individuals are faced with real business challenges. Criticism has also been directed at the delivery of EE, with much of the world relying on traditional pedagogical methods such as lectures, textbooks, and formal assessments (America & Neethling, 2023; Gibb & Price, 2014; Lackéus et al., 2013; McKeown et al., 2006) which may be stifling an individual's acquisition of competitive aggressiveness.

H10 + : Entrepreneurial education has a positive influence on self-efficacy

In South Africa, the analysis revealed a significant positive relationship ($p < 0.05$) between entrepreneurial education (EE) and self-efficacy, supporting hypothesis H10. However, in Scotland, the corresponding p value of 0.060 ($p > 0.05$) indicated no significant relationship between EE and self-efficacy. This led to the acceptance of the null hypothesis, suggesting that EE does not influence self-efficacy in the Scottish context.

This finding is intriguing, as it diverges from some existing literature. For instance, Jin et al. (2023) found that individuals in societies with high power distance (marked by inequality) tend to have lower levels of self-efficacy compared to those in societies with low power distance. Similarly, studies suggest that students from individualistic cultures typically possess higher self-efficacy due to their emphasis on personal responsibility (Tan et al., 2021; Wang et al., 2020). Conversely, individuals from collectivistic cultures may exhibit lower self-efficacy due to their aversion to experiences with failure (Ahn et al., 2016).

Conclusions

All countries, including Scotland and South Africa, face a range of socioeconomic difficulties. But South Africa, as a developing nation, frequently feels these problems more keenly. In South Africa, unemployment stands out as a significant issue. It has been argued that to solve these issues, nations should strive for economic growth, which may be attained through the creation of jobs in the labour market. It is also essential to provide people with the information and abilities needed to be employable. Campaigns and reports from Scotland and South Africa urge the youth to start their own businesses as a way to help lower unemployment. The purpose of this study was therefore to assess the influence of EE on the IEO of university students in a developed and developing market context. Overarching findings of this study confirmed that a statistically significant difference exists between South Africa and Scotland in term of the influence of EE on IEO. Nine of the 10 hypotheses formulated for this study were accepted for South Africa, while only four were accepted in support of Scotland. This outcome was intriguing, as the initial assumption was that Entrepreneurial Education (EE) would have a more substantial influence on the Individual Entrepreneurial Orientation (IEO) of Scottish students, given Scotland's more pronounced EE pedagogy. However, the findings from the quantitative study led the researcher to conclude that while EE does influence the IEO of university students in South Africa, its effect on the IEO of university students in Scotland is not as significant. The findings of this study add to the existing body of knowledge by quantifying of the EE on the IEO of university students in both a developing and developed economy. The study further proposed an adapted measuring instrument that was constructed through the use of a variety of different scales and was found to be reliable in these two differing contexts. Practically, the findings of this study provide a basis for other researchers to make use of the measuring instrument in an educational context. In addition, the findings provide inputs into pedagogical methods that will stimulate IEO and create a more conducive learning environment. The findings suggest a need for more customized Entrepreneurial Education (EE) programs in different economic contexts. Universities should implement programs that include hands-on business creation exercises, mentorship opportunities with successful entrepreneurs, and practical workshops to enhance employability and entrepreneurial skills. In terms of policy implications, South Africa can benefit from policies that support youth entrepreneurship by reducing barriers to entry for young entrepreneurs. This could include providing easier access to funding, simplifying registration processes for new businesses, and offering tax incentives for startups. Scotland, on the other hand, might need policies that encourage deeper engagement with existing EE programs, possibly by integrating entrepreneurship

more thoroughly across various disciplines, beyond business studies. Both countries could benefit from stronger partnerships between universities and the private sector. In addition, universities in both countries should implement feedback loops where student outcomes are tracked and used to refine and improve EE programs continually.

The study however also faced limitations. These included the phrasing of the instrument, which was in English. Given the diverse cultural backgrounds in South Africa and Scotland, a portion of respondents may not have been first-language speakers English and may have had differing exposure to EE. These factors may have influenced their understanding of the questions. In addition, the usability of the questionnaire in its current format cannot be guaranteed in other countries that may differ in terms of EE and the country's economic context. Future research could however consider other moderating, mediating and environmental factors that may be affected by the EE received by students. Future studies can also validate the measuring instrument other developing and developed economies with socio-economic characteristics similar to those of South Africa and Scotland. Finally, a longitudinal study would shed important insights into the long term effects of various types of EE on IEO.

Abbreviations

EE   Entrepreneurial education
EAO   Entrepreneurial attitude orientation
EFA   Exploratory factor analysis
EO   Entrepreneurial orientation
GDP   Gross domestic product
IEO   Individual entrepreneurial orientation
IWE   Industry/work experience
KMO   Kaiser–Meyer–Olkin
LAE   Learning about entrepreneurship
LFE   Learning for entrepreneurship
LTE   Learning through entrepreneurship
MANOVA   Multivariate analysis of variance
SPSS   Statistical package for the social sciences

Author contributions
DTA collected the data and authored substantial parts of the manuscript. CS and CN supervised the project and authored substantial parts of the manuscript. All authors have read and approved the manuscript.

Availability of data and materials
The data sets used and/or analysed during the current study available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
Ethical clearance for the study, under code 23SOM/BM02, was obtained from the ethics committee from the College of Business and Economics at the University of Johannesburg. Participants provided written consent to participate in the study.

Consent for publication
Participants were informed of their rights, including right to anonymity, confidentiality, use of data in future research, as well as right of withdrawal at any time prior to completing the questionnaire. An informed consent form was completed by each participant.

Competing interests
The authors declare that they have no competing interests.

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