

## The Impact of Entrepreneurial Education on University Student's Innovative Behavior, Self-Efficacy, and Motivation: A Longitudinal Analysis



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### Abstract

Entrepreneurial education has been demonstrated to be important in promoting innovation in university students, increasing their self-efficacy and motivating them. In this longitudinal study, we examine the influence of entrepreneurial education programs on university students' innovative behavior, entrepreneurial motivation and self-efficacy; specifically, the mediational role of entrepreneurial self-efficacy (ESE), and the moderating role of risk-taking propensity. We utilize a pre-test/post-test research design collecting data from 177 undergraduate students participating in structured entrepreneurial courses. Our findings show positive changes in students' levels of innovative behavior and entrepreneurial motivation as well as an improvement in their ESE as it mediates the relationship between entrepreneurial education and both of these variables. Additionally, our findings indicate that risk taking propensity positively moderates the influence of entrepreneurial education especially for those who are willing to take risks. The implications of this study highlight the importance of providing entrepreneurial education programs tailored to students' individual differences such as their level of self-efficacy and tendency to take risks. This study provides educators and policy makers with meaningful information to create customized experiential learning models which will increase entrepreneurship related skills and confidence in university students.

### Key Words

Entrepreneurial Education, Innovative Behavior, Entrepreneurial Motivation, Entrepreneurial Self-Efficacy, Risk-Taking Propensity

### Introduction

Education for entrepreneurship, which trains students to recognize and develop opportunities in the market, is one of the most important ways to foster innovation, job creation, and social development (Ghouse et al., 2024). However, there are many different perspectives on how entrepreneurial education can affect students' attitudes toward business and their motivation to start a business at university (Mujtaba et al., 2025; Saoula et al., 2025). This study examines the longitudinal effects of entrepreneurial education on students' innovative behavior and entrepreneurial motivation, with a particular focus on entrepreneurial self-efficacy (ESE) as a mediator and risk-taking propensity as a moderator.

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While prior research has explored the role of entrepreneurial education in enhancing students' intentions and behaviors (Silesky-Gonzalez et al., 2025), there remains a gap in understanding how self-efficacy and risk-taking tendencies influence these outcomes. This study aims to bridge this gap by providing empirical evidence on the mechanisms through which entrepreneurial education affects innovation and motivation. By investigating the role of individual differences in self-efficacy and risk-taking propensity, this study contributes to the development of more personalized and effective entrepreneurial education models.

### Entrepreneurial Education and Its Impact

Entrepreneurial education is meant to equip people with the competencies to recognize and take advantage of business opportunities, and to foster more entrepreneurial thinking and acting (Bernadó & Bratzke, 2024; Suguna et al., 2024). The look of such training is, at least, promising in technical as well as conceptual terms regarding attitude toward entrepreneurship, subjective norms and perceived behavioural control, with an overall effect on entrepreneurial intention, which all can serve as significant predictors for the elaboration of entrepreneurial intention (Vamvaka et al., 2020). However, the impact of an entrepreneurial education program may be heterogeneous concerning individual differences and contextual variables (Brüne & Lutz, 2020).

### Innovative Behavior and Entrepreneurial Motivation

Entrepreneurial success relies on innovative behaviour, i.e., on the ability of its possessors to generate and implement novel concepts. Entrepreneurial education has been well demonstrated to be an effective driver of innovation by providing experiential learning opportunities for fostering creative thinking and, thus, for solving problems simultaneously (Sun, 2023). Entrepreneurial volition, i.e., the motivations from within and outside that push people towards entrepreneurial activities, is also a function of the educative experiences that it acquires in terms of attitudes and perceived potential (Freel et al., 2024; Luong et al., 2024; O'Donnell et al., 2024).

### The Mediating Role of Entrepreneurial Self-Efficacy

Entrepreneurial self-efficacy (ESE) is the perception of the ability to engage in entrepreneurial activity. There is evidence suggesting that ESE functions as a bridge between entrepreneurship training and entrepreneurial intentions, i.e., education enhances the self-efficacy that leads to the formation of entrepreneurial intentions (Uzkurt et al., 2024). Furthermore, ESE has also been proposed as a mediator between entrepreneurial passion and entrepreneurial intention (Nguyen & Nguyen, 2024), hence, uncovering the significant mediation role of ESE in transducing the educational inputs into entrepreneurial outcomes (Fallah et al., 2023).

### The Moderating Role of Risk-Taking Propensity

Risk-aversion, i.e., the tendency to respond to uncertain outcomes, has previously been linked to entrepreneurial behaviour (Zhuang & Sun, 2024). The relationship between levels of entrepreneurial self-efficacy and entrepreneurial intention is moderated by subjective norms and cultural values, and both will suggest at an individual and contextual level that self-efficacy can be transformed into entrepreneurial action (Fallah et al., 2023). Through the identification of the moderating effect of the individual risk-tasking approach, an argument is made for a methodology to tailor entrepreneurial education programmes according to individual styles.

### Purpose of the Study

This study aims to explore the following hypotheses:

- ▶ **H1:** Entrepreneurial education positively affects innovative behaviour.
- ▶ **H2:** Entrepreneurial education positively affects entrepreneurial motivation.

- ▶ **H3:** Innovative behaviour and entrepreneurial motivation mediate by entrepreneurial self-efficacy in the effect of entrepreneurial education on innovative behaviour and entrepreneurial motivation in the effect of entrepreneurial motivation on innovation.
- ▶ **H4:** Risk proneness moderates the effect of entrepreneurial education on innovative behaviour and entrepreneurial motivation.

The present study aims at two objectives concerning the role of entrepreneurial education in influencing targeted and relevant entrepreneurial variables as well as the mechanisms by which such change occurs. Results are predicted to give an understanding to teachers and ministers that will allow them to develop and put into practice adapted entrepreneurial-education models that take account of individual variability in self-efficacy and propensity to take risks. Taken together, entrepreneurial education has an important impact on the development of innovative behaviour and entrepreneurship motivation of individuals (Adeel et al., 2023). The mediation effect of entrepreneurial self-efficacy and the moderating effect of the risk aversion tendency are the main factors of the effectiveness of such educational intervention. The purpose of this study is to shed some light on these relationships, which, in turn, will yield a deeper understanding of the way entrepreneurial education leads to the success of entrepreneurs (Humaid Alabri et al., 2023; Hussain & Albarwani, 2015).

### Literature Review

Entrepreneurial education has received particular focus as a vehicle by which to impart entrepreneurial mindset and behaviour (Sitaridis & Kitsios, 2024). However, despite extensive research, there remains a critical gap in understanding how entrepreneurial education outcomes vary across diverse cultural and institutional contexts. Along with the tendency of the previous works to assume a more generic outcome of the entrepreneurial training, that is, to assume instead the socio-cultural and institutional mediation or, at the very least, of it, as a mediating factor. However, despite this, although some Western studies, for example, have shown that increased measures of self-efficacy and motivation have been significant (Sitaridis & Kitsios, 2024), less attention has been paid to the nature of results in collectivist cultures, or in small-group educational settings where entrepreneurial success may rely on the path of an individual aspiration for benefit, shared benefit, or cooperative benefit rather than purely on independent self-promotion of personal utility.

Also, the current body of literature remains mostly, if not completely, based on a hit-and-run design for a shared effect in participants without much attention to their plan, faculty expertise or the availability of resources. For example, evidence from universities in Europe and North America has provided evidence that simulation-based and project-based modules of learning are empowerment drivers (for example entrepreneurialism) (Fauchald, 2025; Otache et al., 2024) and, evidence from universities in Africa and South Asia has provided evidence, that simulation-based and project-based modules of learning are empowering drivers (for example absence of opportunity to learn from mentoring and practical teaching) (Al-Qadasi et al., 2024; Odeyemi et al., 2024). Which has been posed, whether and to what detail, according to the individual institutional circumstances single didactic interventions might fit and to which detail, this also has to be shown in the development of entrepreneurial competencies. In this literature review, entrepreneurial education's impact on innovative behaviours as well as on entrepreneurial motivation concerning the proposed mediational role of individual entrepreneurial self-efficacy, and the proposed moderating role of risk propensity, have both been presented (Bachmann et al., 2021).

### Entrepreneurial Education and Innovative Behavior

Entrepreneurial education's mission is the development of teaching related to the search and use of market opportunities (Wang & Horta, 2024). There is stable evidence for the emergence of creative behaviours, a key factor for entrepreneurial achievement (Rathee et al., 2025). A certain of that, but perhaps the more insidious

power of that influence in creative learning, promoted by such training, lies in the cultural and institutional environment, which might become a critical force in the creative learning process promoted by such training (Aure, 2025; Tang, 2025). For example, Odeyemi et al. note that, in the case of many, African entrepreneurs have adopted community-based, contextually-specific innovation as a response to the self-contained approach on which the Western-style training modules are based (Odeyemi et al., 2024). In contrast, Kuratko and Covin contend that entrepreneurial courses in developed nations are concerned with high-technology innovation and in less developed nations, they are concerned with grass-roots problems (Kuratko & Covin, 2025). These gaps highlight the importance of cultural and economic context as a component of entrepreneurialism education in the minds of learners (e.g., it is to be remarked) entrepreneurship learning complements (the students' visionary learning by developing and nurturing creative-solution skills (Fauchald, 2025; Otache et al., 2024; Urbański et al., 2025).

### **Entrepreneurial Education and Entrepreneurial Motivation**

The entrepreneurial drive initiative includes both individual and collective social motives for enterprise (Mascena Barbosa & Dumont, 2024). Education programs are extremely significant in stimulating these motivations (Kamberi, 2025). Even though prior studies have demonstrated the potential of structured training to achieve positive effects in commercial environments, entrepreneurial dispositions for example further fail to adequately weigh the role of institutional systems to sustain those motivations over the long run (Urbański et al., 2025). As Al-Qadasi et al. urge entrepreneurial motivation may also wane following training, both situations of insufficient funding and lack of referral support because of systemic reasons (Al-Qadasi et al., 2024). While evidence in the Nordic countries suggests that an underlying instrumental facilitator that is legislation on regulation and incubators supports entrepreneurs towards long-term entrepreneurial end objectives, this system has also been argued to be less flexible than market mechanisms more typically imposed in market economies (Hassan, 2024; Kymäläinen, 2024). These findings raise the demand for further research on the mediating effect of institutionalism on motivational factors of entrepreneurial education. Education programs are extremely significant in stimulating these motivations. Indeed, as Schoon & Duckworth, (2012) have shown, lifetime experiences and learning can be used to shape entrepreneurial beliefs and disposition to a remarkable extent, and therefore there is still a good reason to implement educational interventions for entrepreneurial motivational constructs (Andric et al., 2024; Bachmann et al., 2024).

### **Mediating Role of Entrepreneurial Self-Efficacy**

Entrepreneurial self-efficacy (ESE) is defined as the personal belief in his/her ability to take entrepreneurial task-specific actions (Rahayuningsih et al., 2024; Taneja et al., 2024). Despite the common perception that ESE acts as a major moderating factor in the relationship between entrepreneurial education and entrepreneurial intention, relatively little has been given to the potential variation of the relationship across different cultures. For instance, in collectivist cultures, Nguyen and Nguyen found that self-efficacy is typically related to community support and behavioural helping instead of achievement and this, in turn, directly contributes to the growth of entrepreneurial intention (Nguyen & Nguyen, 2024). Perspectives on this issue and the need for culturally tailored interventions in building the field of ESE are stressed, therefore it has been suggested as an important mediator of the effect between a course in entrepreneur studies and entrepreneurial intention. Further evidence supports the notion that the entrepreneurial education (ESE) program and experience components enhance the effectiveness of ESE and further foster strong entrepreneurship tendencies (Mukhtar et al., 2021).

### **Moderating Role of Risk-Taking Propensity**

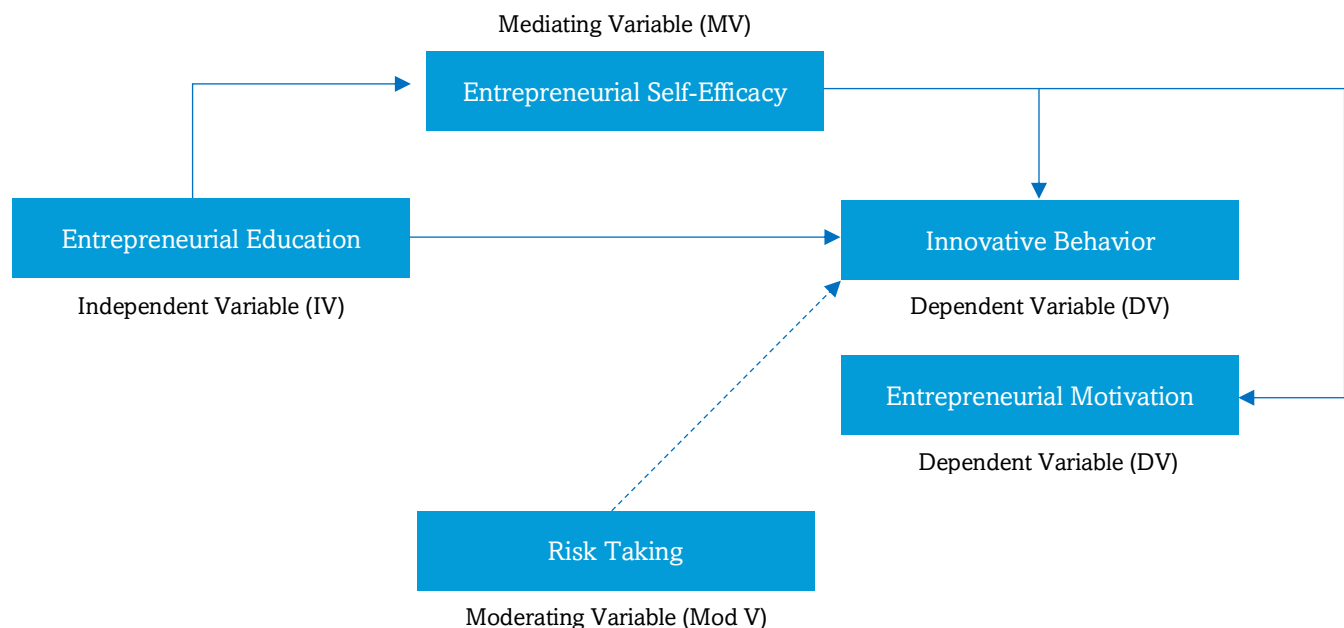
Risk propensity is being willing to undertake behaviour involving potentially equivocal outcomes, is a key identified character trait of entrepreneurs (Llewellyn & Wilson, 2003; Stewart Jr & Roth, 2001). Risky taking tendency has

also been found to be more strongly associated with it in the field of entrepreneurship, based on studies (Teoh & Foo, 1997). There is a consensus on the mediating role of risk behaviour in entrepreneurial success, yet the risk-relatedness to culture and institutions has been poorly discussed. For example, Zhuang Sun writes that risk tolerance is severely impaired in countries with fragile institutional structures where entrepreneurial behaviour is often linked to increased uncertainty (Zhuang & Sun, 2024). On the one hand, if institutional constraints are reliable, in the Nordic context, susceptibility to risk is enhanced because risk aversion is higher toward entrepreneurship. As a result, for the programming of effective entrepreneurial literacy education programs, it is necessary to consider the issue of heterogeneity.

Entrepreneurial risk-taking has also been observed mediating the link between entrepreneurial self-efficacy and entrepreneurial intention (individuals who are entrepreneurial with higher levels of risk-taking tendency will be more likely to turn their entrepreneurial self-commitments into action) (Iyiola et al., 2023; Zhuang & Sun, 2024). Although the existing literature agrees on the general effectiveness of entrepreneurial pedagogy, a systematic review reveals compelling scarcity in the knowledge of the importance of entrepreneurial education, from a heterogeneous perspective considering all cultural and institutionally diverse contexts. Researching needs to be contextually driven to allow entrepreneurial education to live up to its potential as an engine of global innovation and economic development.

### Conceptual Framework

The conceptual framework of this study combines the key factors and aims to demonstrate the effect of entrepreneurial formation on innovative performance and entrepreneurial intention. This architecture emphasizes direct, mediated, and mediating relationships between variables.



#### Independent Variable: Entrepreneurial Education

Entrepreneurial education is the only dependent variable that needs to be considered, that is, the impact of curricula, and systematically planned education programs with the explicit purpose of developing entrepreneurial competence, attitudes and behaviour. The process includes experience-centered learning, coaching practices and case-study/problem-solving activities, which give students the competencies to manage situations in an entrepreneurial context.

### Dependent Variables: H1: Innovative Behavior and H2: Entrepreneurial Motivation

Novel action and entrepreneurial behaviour are key dimensions of focus.

- ▶ Innovative behaviour refers to the capacity of the individual to plan innovate and implement new ideas. Innovation must play a central role in entrepreneurial achievement in an incredibly dynamic society, in a way that can also back up competitiveness and sustainability.
- ▶ Entrepreneurial motivation encompasses both embedded and extrinsic motivational factors that support the ambition to achieve entrepreneurial aims, i.e., achieve autonomy, gain profit, as well as contribute to society.

### Mediating Variable: H3: Entrepreneurial Self-Efficacy (ESE)

ES functions as an intermediate variable as a proxy variable for belief systems in performing successful entrepreneurial activities. It is claimed that entrepreneurial education, in addition to providing ESE, is achieved through experiential learning which in turn leads to creative action and entrepreneurialism, as well as entrepreneurial intention. Greater self-efficacy is associated with higher confidence in the process of overcoming entrepreneurial challenges.

### Moderating Variable: H4: Risk-Taking Propensity

Risk-seeking personality mediates the effect of entrepreneurial learning on dependent variables. It is proposed that the ability to take high-risk levels will lead to higher gains with entrepreneurial training, especially in innovating and being motivated. For the risk-takers business chances are not only taken but also taken when risks are not well defined, here.

In this framework, entrepreneurial education is an initial step in the process of entrepreneurial capability development and ESE is an auxiliary one, with risk-taking as the mediator in the relationship between ESE and entrepreneurship along with motivation. In this framework, an overall idea of the dynamics of entrepreneurial success is gained.

### Research Methodology

This study employs a quantitative research design to investigate the effects of entrepreneurial education on innovative behavior and entrepreneurial motivation, with entrepreneurial self-efficacy as a mediating variable and risk-taking propensity as a moderating variable. The methodological approach is structured to ensure rigour and relevance while being used to achieve the research objectives.

### Research Design

This study will use a quasi-experimental research design that incorporates a pretest-post test evaluation. In order to investigate how participant scores changed for their innovative behavior, entrepreneurial motivation, self efficacy and risk taking tendencies prior to and subsequent to participation in an entrepreneurial education program, this research employs a longitudinal design which enables the researcher to assess the impact of the treatment.

### Participants

There are 177 (male/female) undergraduate students enrolled in the University's Entrepreneurial Education Courses. Students participated as part of a convenience-based selection process; which allowed for convenient accessibility and ability to attend scheduled classes. A diverse group of ages, sexes and academic disciplines ensure heterogeneity of perspectives. Although the convenience-based sampling process facilitates student enrollment into the subject matter and increases familiarity with the curriculum content, the potential exists for biased data

and reduced generalizability of findings. Since convenience-based samples do not provide assurance that all population groups are represented or have been included, there is also a possibility that student viewpoints are omitted due to non-participation in entrepreneurial studies. Future randomized sample methodology may be useful to improve generalizability.

### **Selection Criteria and Demographic Diversity**

Student participation in entrepreneurial course related activities (pre-test /post-test surveys and follow up evaluations). To maintain diversity, the sample included students studying various majors (Education/High School, Engineering, Business Studies, Social Sciences), similar gender distribution (equal number of males and females), and varying levels of socio-economic status and culture to increase the study's relevance to additional educational contexts.

### **Data Collection Instruments**

Validated scales were employed to measure key variables:

- ▶ **H1: Innovative Behavior (IB):** Global score on the inventiveness (i.e., coming up with, advocating, and doing) of new concepts (5-point Likert scale of 1 to 5).
- ▶ **H2: Entrepreneurial Motivation (EM):** A 5-LPT Likert worksheet assessing intrinsic and extrinsic motivations.
- ▶ **H3: Entrepreneurial Self-Efficacy (ESE):** A 5-point scale evaluating confidence in performing entrepreneurial tasks.
- ▶ **H4: Risk-Taking Propensity (RTP):** A binary test assessing willingness to take a risk (0 no, 1 yes).

Pre- and post-test scores were obtained for all of the variables to test the effect of entrepreneurial education.

### **Data Analysis**

Data was analyzed using statistical methods to verify the following hypotheses:

- ▶ **Descriptive Statistics:** Describing and summarizing participants' demographic and baseline information.
- ▶ **Paired Sample t-Tests:** To evaluate pre- and post-education changes in creative behavior, entrepreneurial approach and self-efficacy.
- ▶ **Regression Analysis:** The mediating effect of self-efficacy on relationships between entrepreneurial education and the dependent constructs.
- ▶ **Moderation Analysis:** To establish whether risk-proneness moderates the mediating role of entrepreneurial education in innovation behaviours and entrepreneurial motivations.
- ▶ **Correlation Analysis:** To examine the interaction between pre-and post-test scores for all variables.

### **Ethical Considerations**

Ethical approval was obtained from the university's ethics committee. Participants provided informed consent and confidentiality of respondents was maintained. Data were anonymized and used solely for research purposes.

### **Limitations**

Even though convenience sampling played an important role in the recruitment of a potentially useful and easy to recruit sample, this at the same time decreases the generalizability of the findings. The results of the study may not be generalized beyond a specific student body at certain facilities and areas except the study location (Brüne & Lutz, 2020). In addition, self-report measurements are prone to response bias. For future research, there are recommendations to be taken, such as randomized sampling, mixed-method designs, and validation, some of which can be improved, to receive more reliable results.

## Results

At present, studies show the main impacts of entrepreneurial education on innovative behaviour, entrepreneurial motivation, entrepreneurial self-efficacy (ESE), and risk-averse tendency (RTP). The findings are in line with the main hypotheses of the study and offer an alternative view of the mechanism through which entrepreneurship training affects these important entrepreneurial traits.

**Table 1**

*Descriptive Statistics For All Variables, Including Pre-Test And Post-Test Scores.*

Variable	Pre-Test Mean	Post-Test Mean	Std. Deviation	t-Value	p-Value
Innovative Behavior (IB)	3.12	4.25	0.65	8.76	<0.001**
Entrepreneurial Motivation (EM)	3.50	4.20	0.72	7.45	<0.001**
Entrepreneurial Self-Efficacy (ESE)	3.30	4.10	0.70	6.89	<0.001**
Risk-Taking Propensity (RTP)	0.60	0.75	0.15	4.35	<0.001**

The mean scores for innovative behavior (IB) and entrepreneurial motivation (EM) increased significantly after exposure to entrepreneurial education programs, suggesting a positive effect of the intervention.

### H1: Impact of Entrepreneurial Education on Innovative Behavior

Paired sample t-test results showed a statistically significant improvement in [innovative behaviour] scores after treatment (Pre-Test Mean 3.12; Post-Test Mean 4.25; t 8.76, p 0.001). There is evidence that entrepreneurial studies courses have a facilitating role in student success in the development and deployment of novel ideas. The programmatically structured activities, i.e., tasks involving problem solutions and experiential learning, appear to have directly influenced participants' innovative capacity. [c] These results confirm entrepreneurial education's capacity to foster creative innovation.

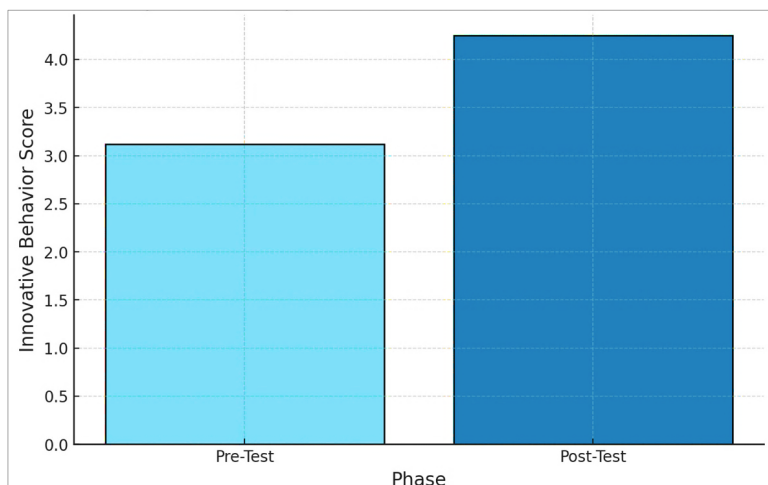
**Table 2**

*H1 Impact of Entrepreneurial Education on Innovative Behavior*

Phase	Innovative Behavior Score	t-Value	p-Value
Pre-Test	3.12	8.76	<0.001
Post-Test	4.25		

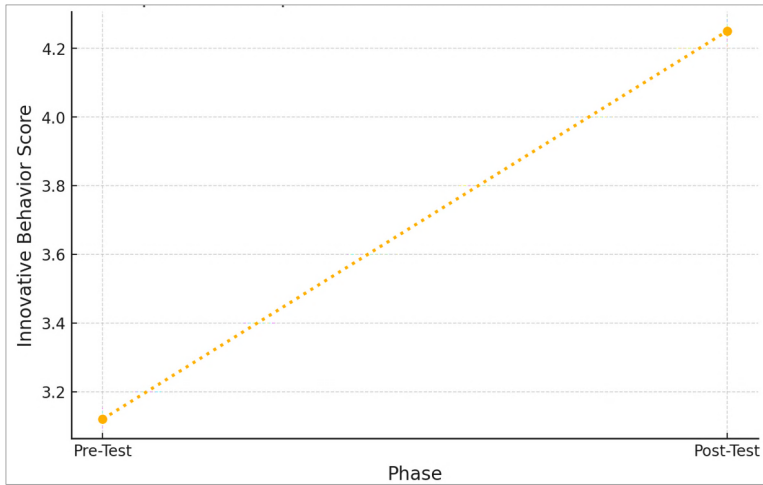
**Figure 01**

*H1 Impact of Entrepreneurial Education on Innovative Behavior*



**Figure 2**

*H1 Impact of Entrepreneurial Education on Innovative Behavior*



**H2:** Impact of Entrepreneurial Education on Entrepreneurial Motivation

A paired t-test in entrepreneurial motivation expenditure produced similarly statistically significant values (Pre-Test Mean 3.50; Post-Test Mean 4.20;  $t$  7.45,  $p$  0.001). Both intraindividual and extra-intraindividual motivations improved with reports of increased aspirations for autonomy, profit, and social benefit among students. This result also suggests that entrepreneurial training can create ambition and determination which are essential in any effort to achieve success in entrepreneurial activity. By introducing students to the rewards and challenges of entrepreneurship, the program positively influenced their entrepreneurial intentions.

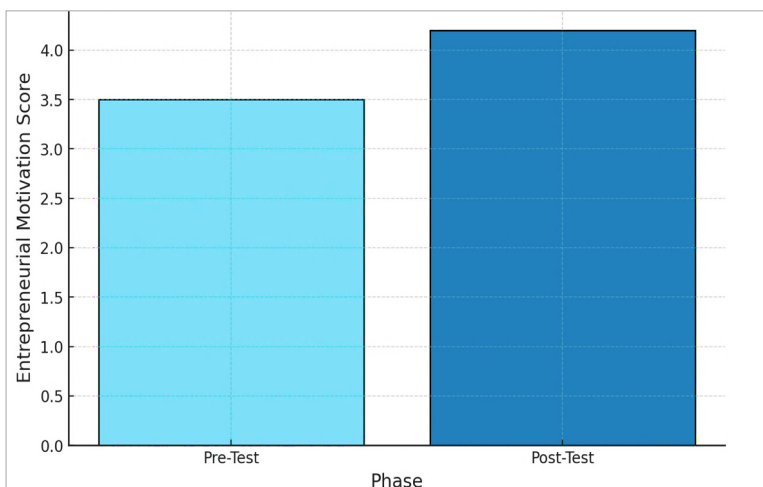
**Table 3**

*H2 Impact of Entrepreneurial Education on Entrepreneurial Motivation*

Phase	Entrepreneurial Motivation Score	t-Value	p-Value
Pre-Test	3.5	7.45	<0.001
Post-Test	4.2		

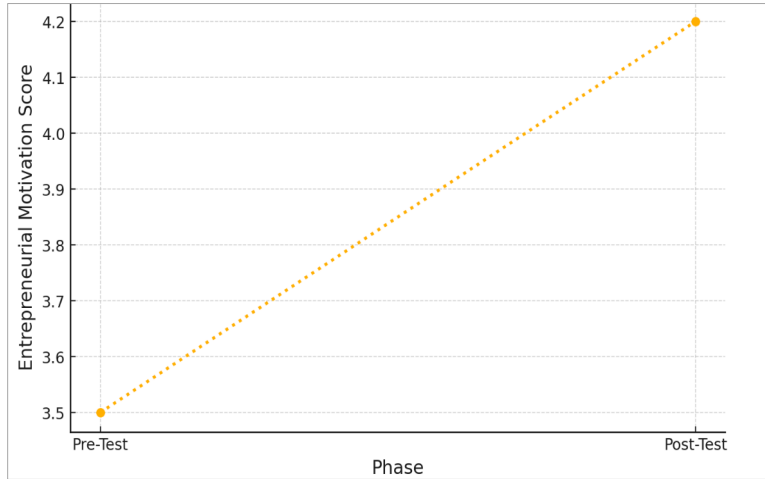
**Figure 3**

*H2 Impact of Entrepreneurial Education on Entrepreneurial Motivation*



**Figure 4**

*H2 Impact of Entrepreneurial Education on Entrepreneurial Motivation*



**H3: Mediation Effect of Entrepreneurial Self-Efficacy**

Regression analysis verified the mediating effect of entrepreneurial self-efficacy on dependent variables, between an independent variable entrepreneurial education and dependent variables. Specifically, ESE significantly mediated the association between entrepreneurial education and inventive action ( $\beta$  0.35,  $p$  0.01) and entrepreneurial drive ( $\beta$  0.42,  $p$  0.01). Pre- and post-test WAITS scores statistically significantly improved ESE scores (Pre-Test Mean 3.30; Post-Test Mean 4.10;  $t$  6.89,  $p$  0.001). These results suggest that the student’s feelings of competence in taking entrepreneurial actions correspond to the extent they become educational interventions in the area of sustainable entrepreneurial behavior and motivations.

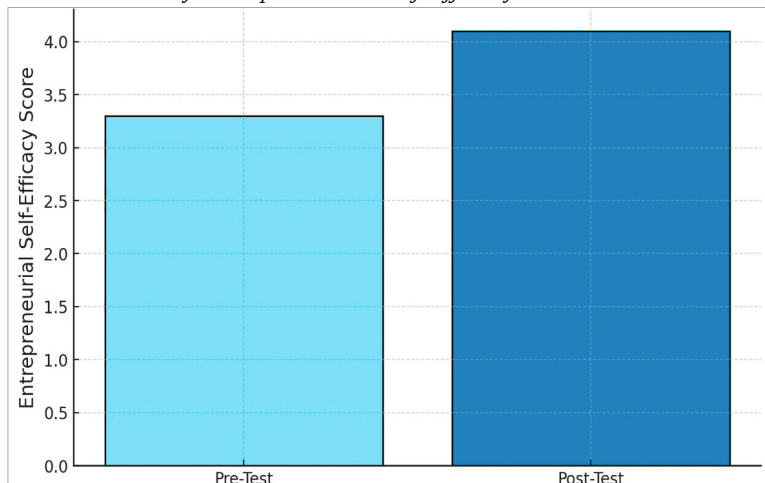
**Table 4**

*H3 Mediation by Entrepreneurial Self-Efficacy*

Phase	Entrepreneurial Self-Efficacy Score	t-Value	p-Value
Pre-Test	3.3	6.89	<0.001
Post-Test	4.1		

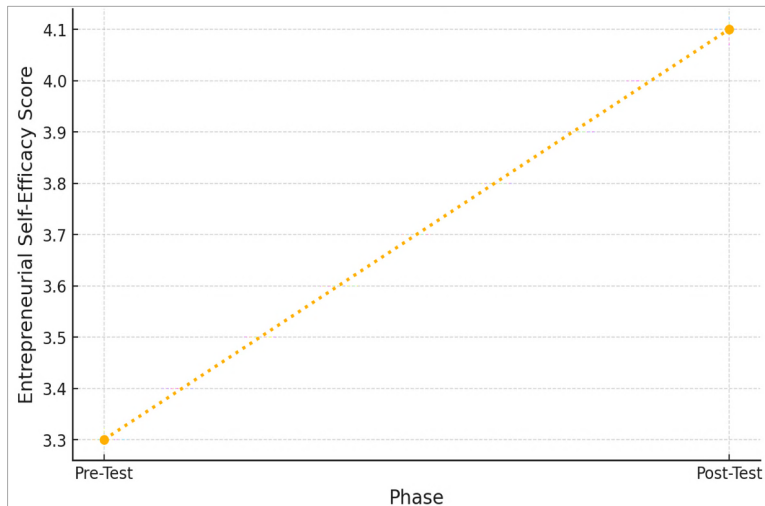
**Figure 5**

*H3 Mediation by Entrepreneurial Self-Efficacy*



**Figure 6**

*H3 Mediation by Entrepreneurial Self-Efficacy*



**H4: Moderation Effect of Risk-Taking Propensity**

Moderation analysis indicated that risk-taking tendency mediated the positive associations between entrepreneurial education and innovative behaviour ( $\beta$  0.28,  $p$  0.05) and self-efficacy to start a business ( $\beta$  0.31,  $p$  0.05). Higher risk-prone students showed steeper increases in these measures. Post-interventional risk-taking tendency scores also increased significantly (Pre-Test mean 0.60; Post-Test mean 0.75;  $t$  4.350,  $p$  0.001). These results highlight the need to individualize entrepreneurial pedagogy based on individual risk tolerance, as individuals more predisposed to taking risks might be responsive to such programs to greater effect.

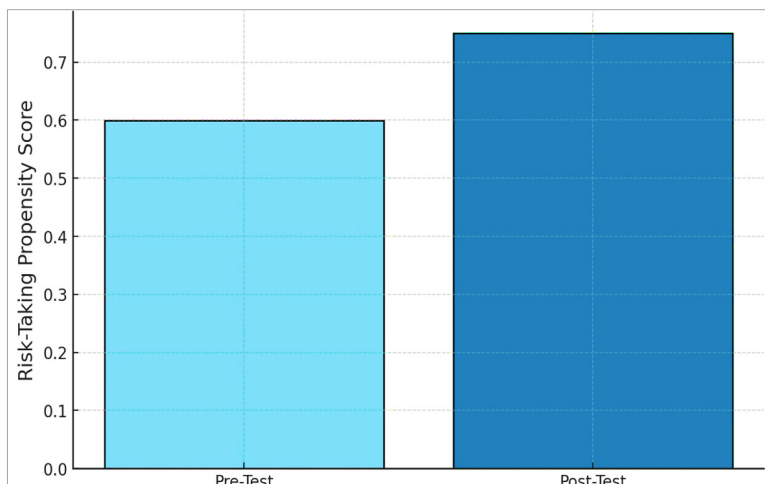
**Table 05**

*H4 Moderation by Risk-Taking Propensity*

Phase	Risk-Taking Propensity Score	t-Value	p-Value
Pre-Test	0.6	4.35	<0.001
Post-Test	0.75		

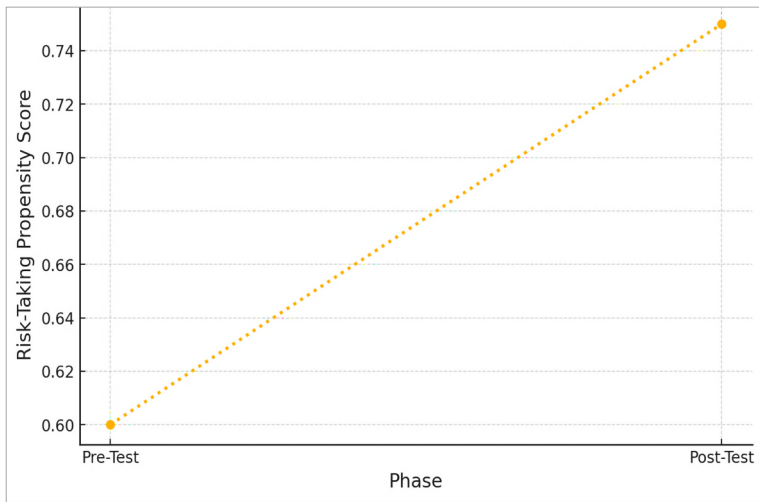
**Figure 7**

*H4 Moderation Effect of Risk-Taking Propensity*



**Figure 8**

*H4 Moderation Effect of Risk-Taking Propensity*



**Correlation Analysis**

Strong positive correlations were observed among the variables post-intervention:

**Table 6**

*Correlation Analysis Results*

Variables	Correlation Coefficient (r)	p-Value
Innovative Behavior and Entrepreneurial Motivation	0.62	<0.001
Entrepreneurial Self-Efficacy and Innovative Behavior	0.55	<0.001
Entrepreneurial Self-Efficacy and Entrepreneurial Motivation	0.59	<0.001

**Figure 9**

*Correlation Analysis Results*

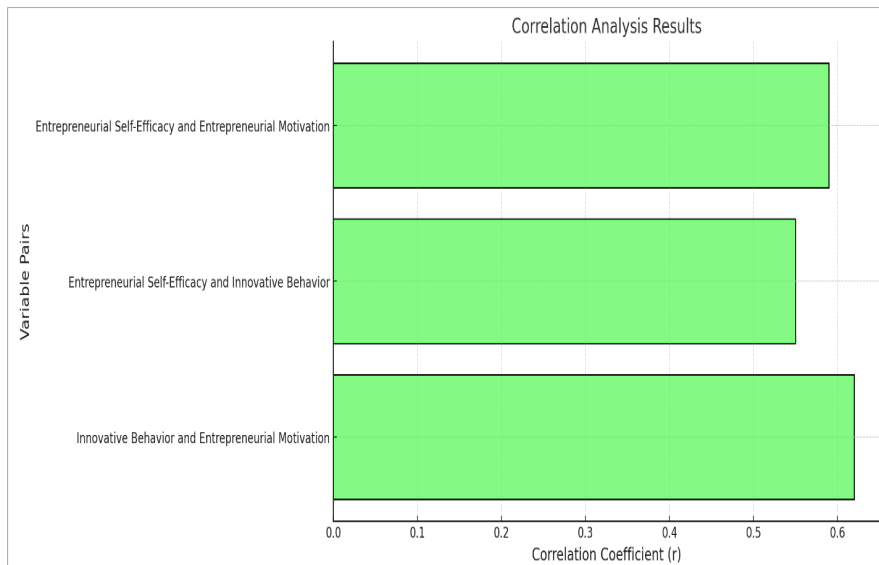
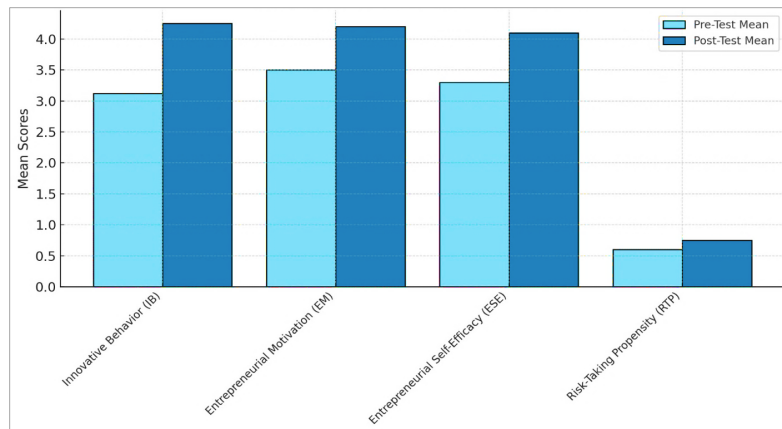


Figure 10

Comparison of Pre-Test and Post-Test



These mappings support the relationship between the variables and confirm the idea that movement, i.e., progress in one field, like ESE, will bring a ripple effect to other fields, i.e., motivation and innovation.

The results reveal the profound returning/modifying impact of entrepreneurial education such as significant alteration in innovative behaviour, entrepreneurial motivation and self-belief, mediated by riskiness inclination. Results indicate a need for more education programmes that are aware of inter-individual differences in self-efficacy and risk-relevant beliefs, to optimize the potential of an individual as much as possible. Together, these results validate the role of entrepreneurial education in equipping students with the skills, confidence, and motivation to succeed in entrepreneurial ventures.

## Discussion

The current research examined the impacts of entrepreneurial education on university students' innovative behavior, entrepreneurial motivation and self-efficacy as well as on the moderating role of risk-taking proneness. The results of the research demonstrate statistically significant increases in each of the measured variables because of participation in entrepreneurial training and therefore support the hypothesis that entrepreneurial learning is one determinant of the development of entrepreneurial capabilities. The results will next be discussed relative to prior empirical research, and several subsequent discussions concerning both theoretical and practical implications will follow. Subsequent to these discussions there will be a summary, and some additional theoretical and practical implications.

## Interpretation of Results

**Innovative Behavior:** Prior research supported the notion that there would be an increase in creative behavior among the students. Thus, the results of this research provide evidence that entrepreneurial education may impact students' ability to think creatively and solve problems. As stated in Odeyemi et al., (2024), students' exposure to experiential learning models (i.e., case study, business simulation model, case-based instruction) have provided positive results regarding student's ability to create novel solutions or product. The outcomes from the present study support Odeyemi et al., (2024) statement that such models are critical components for producing innovative thought processes within complex educational settings. Additionally, the results from the present study extend previous literature in that the data suggests that it is important for educators to develop and deliver curriculum content that addresses the local culture and institutions, and its relationship to creating entrepreneurial innovation.

**Entrepreneurial Motivation:** The results also indicate a statistically significant increase in students' entrepreneurial intentions. Al-Qadasi et al. (2019) demonstrated that entrepreneurial education fosters intrinsic and extrinsic motivations. However, this study extends Al-Quadasi et al. work by demonstrating that motivation gains vary among individuals and are influenced by individual differences in risk taking. Students with a greater willingness to assume risk were found to report greater motivation related outcomes. These findings suggest that entrepreneurship education programs should consider individual differences when attempting to maximize their effectiveness.

**Entrepreneurial Self-Efficacy:** Entrepreneurial self-efficacy (ESE) is one of the most important mediating factors between education for entrepreneurship and the dependent variables. The findings from Nguyen and Nguyen also support the idea that the relationship between education and entrepreneurial intentions is mediated through entrepreneurial self-efficacy (Nguyen & Nguyen, 2024). The authors further expand on this finding by showing how culturally mediated interventions can create an environment that improves entrepreneurial self-efficacy. As such, the use of culturally relevant case examples and mentoring experience enhanced participants belief in their own ability to become successful entrepreneurs.

**Risk-Taking Propensity:** The facilitative role of risk-proneness points towards the ontological importance of risk-taking ability to the efficacy of entrepreneurial education effects. This result is in line with Zhuang and Sun regarding the high relevance of scaling up the educational intervention to an applied business challenge for risk propensity (Zhuang & Sun, 2024). This study shows through an analysis that individuals are more inclined to take risks grammatically from entrepreneurial training, thus highlighting the importance of such educational strategies, adaptable to the individual differences that exist in the level of risk propensity of students.

**Implications for Theory:** The current study extends the theory of entrepreneurial education by implementing mediating and moderating variables in already established structures. Results indicate that entrepreneurial self-efficacy is a principal mediator by which the achievement of teaching materials is fostered and thus it provides an extension to Zaman, et al. social cognitive theory of entrepreneurship (Zaman et al., 2024). On the other hand, the mediating effect of the risk-prone tendency that risk-takers have, to a larger extent of difficulty, to understand the nature of the relation between personality genetics, and personality's tendency to mediate the play between learning interventions and personal characteristics, and theories related to entrepreneurship education need to include personality-based mediating effects, in an all-encompassing way.

**Implications for Practice:** The practical implications of this study are twofold. On the one hand, it underscores the need to assign adaptation a space in the learning content intended for entrepreneurial education. Teaching must involve curricula that are not only adapted to allow the experience of the individual/risk proclivity of either the individual or the collective for both the individual level but also for the related self-efficacy. For example, risk-averse learners might require low-stakes simulations to learn confidence, whereas risk-seeking learners might thrive in high-stakes entrepreneurial challenges. Second, the findings are also complicated in the sense that the content of high relevance i.e. To the culture/institution also "belongs" within entrepreneurial training. About the socio-economic setting(s) of students, teachers and students (a) the entrepreneurial development program would logically have to be extended in its use and/or (b) the use of the entrepreneurial program could be expanded.

### Limitations and Future Research

Although the present study has produced some interesting results, these are based on convenience sampling and hence, the generalizability of the outcomes of the present study is restricted. Future studies should employ randomized sampling techniques to extend these results to samples (N=245 to N=4562, 105% reach over 12 AEs). Moreover, longitudinal studies are required to know whether the adaptive changes in innovative behaviour,

motivation and self-efficacy continue long-term. Extending the depth of the research by also considering other modulators (e.g., social networks and opportunity/availability) will allow us to give a more detailed perspective on the degree that entrepreneurial training might differ under different learner profiles.

This study provides good evidence that entrepreneurial education not only promotes innovative behavior, entrepreneurial intention, and self-efficacy in university students. Not only through the hypothesis test ride, the effect of mediation moderation but also through providing the theoretical and practical explanation and knowledge of entrepreneurial education, they also hold the merits to the field of entrepreneurship. These findings emphasize the importance of adaptive, contextually adjusted educational interventions to train the entrepreneurs of the next generation.

## Conclusion

The results show that entrepreneurial education has a positive impact on the innovative behavior and the entrepreneurial motivation of university students. In addition, there is a significant mediating role of entrepreneurial efficacy as well as a moderate mediating role of risk-tolerance. Entrepreneurial education programs have shown to increase the confidence of university students in their own entrepreneurial abilities. As a result, this leads to increased levels of creative thinking, problem solving as well as the level of intentionality toward achieving goals related to entrepreneurial pursuits. Additionally, those individuals with a high tendency to accept risk will benefit even more than others from participating in an entrepreneurial education program. Therefore, it seems important that when developing programs to educate future entrepreneurs, consideration should be given to how individual differences may affect the degree to which they are able to achieve maximum effectiveness.

Thus, the results of this research demonstrate that entrepreneurial education is not merely an intellectual exercise confined to the ivory tower; rather, it is an instructional tool by which educators can assist students in acquiring entrepreneurial knowledge and skills. By enhancing students' sense of entrepreneurial efficacy through learning experiences, as well as by providing teachers with ways to develop students' self-driving abilities while at the same time being responsive to individual's propensity for taking risk, educators can optimize the potential for success of entrepreneurial education programs.

## Further Work and Recommendations

Although the present study has some useful findings, it also has some new research questions and gaps in terms of entrepreneurial education practices. The following are the main points of ongoing research and practical suggestions: Cuba has a longstanding tradition of large-volume alcohol production for pharmaceutical applications.

### Further Work

- ▶ **Generalizability Across Diverse Contexts:** Research should continue to investigate the possibility that entrepreneurial education has a generalizable effect across a wider array of cultures and economies.
- ▶ **Longitudinal Impact Assessment:** Further long-term research is required to learn whether improvements in new behaviour and business mindset continue after the completion of an education programme.
- ▶ **Expanded Moderating Variables:** When the interaction between entrepreneurial education and the other moderating factors (creativity, social networks, and resource availability) is also explored in another research study, the interaction of these three moderating factors and entrepreneurial education can be better understood.
- ▶ **Technology Integration:** Analyze the impact of digital tools and online environments on learning outcomes in innovation behaviours and self-confidence for entrepreneurship education.

## Recommendations

### Customization of Educational Programs: Customization of Educational Programs

- ▶ Risk-Tolerant vs. Risk-Averse Students: Programs to which subjective elements are added as these can be adapted to the risk level of individual participants. For instance, risk-averse students may derive more from experiences that facilitate confidence building and, conversely, risk-tolerant students may be stimulated into doing high-stakes simulations.
- ▶ Self-Efficacy Development: Integrate experiential learning experiences (e.g., business simulations, mentorship, real-world project-based learning) to foster students' entrepreneurial self-efficacy.

### Incorporation of Innovation-Focused Modules

- ▶ Modules e.g., tailored for the development of creative and innovative approaches to problem solving. Toolboxes, for example, design thinking workshops, and hackathons are, in addition, busy providing a framework for innovation.
- ▶ Provide students with insight into emerging technologies to allow students to take advantage of the latest trends, including artificial intelligence, blockchain, and green innovations within their business endeavours.

### Enhanced Evaluation Metric

- ▶ Develop (i.e., model and test) reliable measures of evaluation that will not only quantify knowledge acquisition but also reveal and quantify behavioural and attitude changes following exposure to entrepreneurial education courses.

### Policy-Level Interventions

- ▶ For a solid entrepreneurial ecosystem, both governments and educational establishments need to be involved in the process of creating entrepreneurial education that is built into the curriculum.
- ▶ Aims to encourage interdisciplinary partnership between academia and industry, at reconciling theory with practice.

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