Comparative analysis of entrepreneurial intention models: Self-efficacy *versus* entrepreneurial characteristics[1]

Análise comparativa de modelos de intenção empreendedora: Autoeficácia *versus* características empreendedoras

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Abstract

Purpose: The purpose of this research is to analyze whether self-efficacy and entrepreneurial characteristics (e.g., risk-taking, planning, opportunity recognition, persistence, sociability, innovation, and leadership) differ in the explanation of entrepreneurial intention models, having entrepreneurial education as a moderator of relationships.

Originality/value: This paper offers an in-depth perspective on which behavioral characteristics fit best into entrepreneurial intention models and helps to fill a theoretical and practical gap on the need for university education to increase its positive impact on human capital, particularly on students' professional skills, demonstrating which characteristics are most impacted by entrepreneurial education.

Design/methodology/approach: Quantitative methodology was employed, and data were analyzed with structural equation modeling. The sample consisted of 1,004 Brazilian university students from public and private universities. The research was conducted in a non-probabilistic way and with a convenience sample. In order to address the research hypothesis and objectives, all constructs were adapted from relevant literature on entrepreneurship.

Findings: The results indicate it seems more appropriate to use a set of entrepreneurial characteristics when investigating an entrepreneurial intention model if you are looking for a higher explanatory factor and a more robust model; also, entrepreneurial characteristics represent a more sensitive model, which brings accurate assessments on factors that affect entrepreneurial intention. With these findings, entrepreneurial education can be planned to shape certain characteristics through actions in the university environment, making it possible to measure the impact of education on entrepreneurial intention.

Keywords: self-efficacy, entrepreneurial characteristics, entrepreneurial intention, entrepreneurial education, Brazil

Resumo

Objetivo: O objetivo da pesquisa é analisar se a autoeficácia e as características empreendedoras (por exemplo, tomada de risco, planejamento, reconhecimento de oportunidade, persistência, sociabilidade, inovação e liderança) diferem na explicação dos modelos de intenção empreendedora, tendo a educação empreendedora como moderadora dos relacionamentos.

Originalidade/valor: O estudo oferece uma perspectiva aprofundada sobre quais características comportamentais se encaixam melhor em modelos de intenção de empreendedorismo e auxilia a preencher uma lacuna teórica e prática sobre a necessidade de a educação universitária aumentar seu impacto positivo sobre o capital humano, particularmente nas habilidades profissionais dos alunos, demonstrando quais características são mais impactadas pela educação empreendedora.

***Design*/metodologia/abordagem:** Foi utilizada metodologia quantitativa e os dados foram analisados com modelagem de equações estruturais. A amostra foi composta por 1.004 universitários brasileiros, de universidades públicas e privadas. A pesquisa foi realizada de forma não probabilística e com amostra de conveniência. Para abordar as hipóteses e objetivos da pesquisa, todos os construtos foram adaptados da literatura de empreendedorismo.

Resultados: Os resultados indicam que pode ser mais adequado utilizar um conjunto de características empreendedoras ao investigar um modelo de intenção empreendedora, quando se busca um fator explicativo superior e um modelo mais robusto; além disso, as características empreendedoras representam um modelo mais sensível, que traz avaliações precisas sobre os fatores que afetam a intenção empreendedora. Com esses resultados, a educação empreendedora pode ser planejada para moldar determinadas características, por meio de ações no ambiente universitário, sendo possível medir o impacto da educação na intenção empreendedora.

Palavras-chave: autoeficácia, características empreendedoras, intenção empreendedora, educação empreendedora, Brasil

INTRODUCTION

The important role that entrepreneurship has in wealth creation, supporting innovation, and establishing small and medium enterprises have been evidenced in many studies (Coulibaly et al., 2018). In Brazil, small and medium-sized enterprises (SMEs) account for 62% of total employment and 50% of the national value-added, percentages that are a little below the Organisation for Economic Co-operation and Development (OECD) averages of 70% and 55%, respectively. In 2017, Brazil's gross domestic product (GDP) growth rate was 1.32%, and in 2018 there was a 0.01% decline from 2017, while in 2019, Brazil's GDP growth rate decreased by 0.18%, displaying a 1.14% rate (World Bank, 2020). These values indicate the economy's reduced ability to generate enough jobs to improve employment quality in current jobs and share economic growth benefits (Fragoso et al., 2020). This may lead to lower consumer activity and reduced investor confidence, which is detrimental to businesses. Further, the country still registers high unemployment rates in the adult population (11.9% in 2019) and especially among youth (27.8% in 2019) (ILO, 2020). Against this, entrepreneurship is seen as a possible economic solution, as it has the potential to enable individuals, and especially youth, to acquire skills and establish their own jobs, contributing to an unemployment rate decline in the country (Coulibaly et al., 2018; Bignetti et al., 2021).

Entrepreneurial activities have important roles in a country's growth and economic development, creating employment and promoting competition (Moraes et al., 2021; Vodă & Florea, 2019). The emergence of entrepreneurial intentions and behavior is essential as the process represents the first phase in actually creating a business, even with long-term prospects (Liñán & Fayolle, 2015; Bignetti et al., 2021). Intentions have been consistently approached as a relevant construct in entrepreneurship research, as shown by Landström and Harirchi (2018) and Lopes and Lima (2019). As many studies emphasize, a high entrepreneurial intention results in a greater possibility for the individual to express the potential for future entrepreneurial behavior (Vodă & Florea, 2019). Therefore, the intention is of the utmost entrepreneurial behavior predictor (Fragoso et al., 2020).

When taking a closer look at entrepreneurship determinants studies, the majority of them focused on issues related to behavioral aspects (Atiya et al., 2019; Moraes et al., 2018), while others took a contextual approach by considering different determinants that may influence entrepreneurship, such as institutional factors (Chowdhury et al., 2019), culture (Gómez-Araujo & Bayon, 2017), and entrepreneurial education (Martin et al., 2013).

Behavioral aspects are split into two main research streams: the *first focuses* on entrepreneurial self-efficacy, which is considered a core competency that distinguishes entrepreneurs from non-entrepreneurs (Asimakopoulos et al., 2019; Zhao et al., 2005). Studies have shown that high self-efficacy can lead to greater entrepreneurial intention (Pittaway & Edwards, 2012; Moraes et al., 2021). Another stream evidenced in the literature is dedicated to entrepreneurial characteristics such as risk-taking, planning, opportunity perception, persistency, sociability, creativity/innovativeness, and leadership (Krakauer et al., 2018; Moraes et al., 2018; Vodă & Florea, 2019). Likewise, entrepreneurial characteristics relate to a common set of characteristics and competencies that individuals have and which may drive them toward entrepreneurship (Moraes et al., 2018).

Prior literature dealing with contextual features of entrepreneurial events has emphasized entrepreneurial education as a core driver of micro-level behavior, as it develops learners' ability to identify new opportunities. Entrepreneurship education is seen as a catalyst for the development of entrepreneurial intention among youth (Aly et al., 2021; Martin et al., 2013). At the university level, entrepreneurship education can increase the development of entrepreneurial potential and raise interest in exploring alternative forms of work (Vodă & Florea, 2019). In Brazil, Greco et al. (2019) showed that 90% of entrepreneurs who engage in venture creation had not attended any training or educational program related to entrepreneurship, while 40% attended only elective classes along with their university studies, as entrepreneurial education is not integrated as a compulsory subject. Moreover, there is a lack of greater diffusion of entrepreneurial education in Brazilian schools at different educational levels (Greco et al., 2019). Therefore, this suggests the need to improve and increase entrepreneurial education courses and other related activities in Brazil. In addition, there is also a lack of studies exploring entrepreneurial orientations within higher education institutions (HEIs), especially using moderators (Cruz et al., 2021).

Although entrepreneurial characteristics and self-efficacy have been used to predict intention, few studies have been dedicated to identify which is the most appropriate antecedent for measuring entrepreneurial intention. Thus, the objective of the research is to analyze whether self-efficacy and entrepreneurial characteristics differ in explaining entrepreneurial intention, having entrepreneurial education as a moderator. The research question is:

- What behavioral aspect fits better in entrepreneurial intention models?

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Although the importance of entrepreneurial characteristics and self--efficacy for new venture creation has long been debated in the literature, the novelty of our paper is threefold: first, this study offers an in-depth perspective on which behavioral traits or characteristic fits better in entrepreneurship intention models (Bignotti & Le Roux, 2016; Newman et al., 2019). There is no consensus in the literature about which behavioral characteristics are more effective in explaining entrepreneurial intention, and this is still a gap in the literature (Campos et al., 2021; Moraes et al., 2021). Secondly, we focused on a developing economy that calls for further investigation into the literature (Cruz et al., 2020; Fischer, Schaeffer et al., 2019; Moraes et al., 2021). In this sense, the Latin American background still remains underexplored, as is the case of Brazil. Thirdly, the study emphasizes the need for Brazilian university education to increase its positive impact on human capital, particularly on students' professional skills (Nowiński et al., 2019). Entrepreneurial education seeks to stimulate entrepreneurial activity and its impact on individuals, organizations, regions, and countries, preparing entrepreneurs with the skills, resources, and competencies they need. However, this literature's insights, discoveries, and conclusions still need further research to become more effective in helping entrepreneurs (Aly et al., 2021; Gianiodis & Meek, 2020). Thus, by determining the most appropriate model for measuring the impact of entrepreneurial education on entrepreneurial intention, the model may envision the planning of entrepreneurial education. This is particularly important for Brazil, as almost half of the Global Entrepreneurship Monitor (GEM) experts (42.5%) consider education and training a limiting condition to entrepreneurship (Greco et al., 2019). However, it is worth highlighting the limitation that the research used a non-probabilistic sample, with the perception of 1,004 students in the Business Administration course from five universities in Brazil.

The article is organized as follows. After this introduction, section 2 articulates the literature on entrepreneurial intention influencers, specifically entrepreneurial characteristics and self-efficacy. Additional perceptions of entrepreneurial education are also discussed, with emphasis on the Brazilian case. Section 3 presents the conceptual model and study hypotheses, and section 4 describes the methodological aspects. Section 5 presents the description and analysis of the results, with the sample data and statistical tests and analysis. At last, section 6 brings the findings in light of existing literature, and section 7 presents the conclusion.

ENTREPRENEURIAL INTENTION

Entrepreneurial intention (EI) represents a state of mind that precedes action and directs a person toward achieving a specific target; it relates to the passage from the formation of an intention to the manifestation of entrepreneurial behavior (Saeed et al., 2015; Vodă & Florea, 2019).

Two main theories have been developed in order to explain how intentions are formed: the Theory of Planned Behavior (TPB) developed by Ajzen (1991) and Shapero's model of the Entrepreneurial Event (SEE) (Shapero & Sokol, 1982). Ajzen (1991) states the more favorable the attitude and subjective norm, combined with a greater perceived behavioral control, the stronger the individual's intention to initiate an organization. Meanwhile, Shapero and Sokol (1982, p. 99) establish that "each entrepreneurial event is the endpoint of a process and the beginning of another". Both models present similarities and differences: TPB and SEE considered an individual's willingness and desirability to start a new business, but only SEE brought the propensity to act into account. Even though these are well-established models, they do not consider exogenous factors in entrepreneurship, such as the effect of education or the rise of an opportunity (Asimakopoulos et al., 2019).

In sum, entrepreneurial intention plays one of the most important roles in the decision to create a new business, and it can be considered an important predictor of behavior, even though the intention is not the action itself (Ajzen, 1991; Liñán & Chen, 2009).

Entrepreneurial intention influencers

Literature on entrepreneurship has expanded widely into sub-topics due to its eclectic nature, but it remains a domain not clearly defined and rather fragmented (Landström & Harirchi, 2018). There are several studies pointing out the most influential factors in EI. It seems EI is influenced by endogenous factors, such as attitudes and perceptions (Liñán & Fayolle, 2015; Newman et al., 2019), as well as by exogenous factors, namely the education an individual receives (Ozaralli & Rivenburgh, 2016).

Moreover, when referring to behavioral aspects, literature hasn't reached a consensus on what variables should be considered (Bignotti & Le Roux, 2016; Krakauer et al., 2018) since some authors endorse the use of self-efficacy (Asimakopoulos et al., 2019; Newman et al., 2019; Zhao et al., 2005), while others entrepreneurial characteristics (Rocha & Freitas, 2014;

Vodă & Florea, 2019) when studying the personal-level characteristics that affect EI. Although entrepreneurial characteristics and self-efficacy have been used to predict intention, few studies have been dedicated to identify which is the most appropriate antecedent for measuring entrepreneurial intention. Therefore, our study is designed to examine which behavioral aspect fits better in entrepreneurial intention models.

In this study, we focused on both self-efficacy and entrepreneurial characteristics, which are perceived as core entrepreneurial determinants (Bignotti & Le Roux, 2016; Krakauer et al., 2018). Research on entrepreneurial self--efficacy demonstrates it as a leading meta-approach to entrepreneurship that assists in understanding entrepreneurial behavior. It is seen as a key construct that influences entrepreneurial motivation, intention, and behavior, as well as a critical target outcome of entrepreneurship education (Newman et al., 2019). In contrast, entrepreneurial characteristics research is conducted as a behaviorist view of entrepreneurship based on or associated with entrepreneurial intention (Bignotti & Le Roux, 2016). Many behaviors are associated with entrepreneurial characteristics (Krakauer et al., 2018), but for this study, risk-taking, planning, opportunity recognition, persistence, sociability, innovation, and leadership are prioritized. These personal-level variables are perceived as core elements that distinguish entrepreneurs from non-entrepreneurs (Bignotti & Le Roux, 2016).

Entrepreneurial self-efficacy

Self-efficacy relates to an individual's belief in their ability to organize and effectively execute actions; it relates to one's conscious belief in their skills and abilities (Bandura, 1986; Markman & Baron, 2003). Thus, literature sees entrepreneurial self-efficacy (ESE) as a key theoretical approach to studying entrepreneurship since it fosters entrepreneurial behavior by heightening an individual's entrepreneurial intentions (Ajzen, 1991; Fragoso et al., 2020; Moraes et al., 2021; Newman et al., 2019). Fragoso et al. (2020) demonstrated that self-efficacy is the main competency considered in entrepreneurial intention models through their assessment of 600 university students from Portugal and Brazil

In addition, prior studies have found that self-efficacy is a reliable predictor in educational settings (Atiya et al., 2019; Krakauer et al., 2018) since students participating in entrepreneurship courses present high entrepreneurial intent. Also, by learning about entrepreneurship, students tend to develop their own strategies to maintain motivation and deal with future

chances of success (Newman et al., 2019). In this respect, universities can foster ESE outside the formal education program's context. Saeed et al. (2015) found that students' perceptions of educational, business, and institutional support for entrepreneurship were strongly and positively connected to their ESE.

Finally, the connection between entrepreneurial self-efficacy, entrepreneurial intention, and entrepreneurial education has found theoretical support in prior studies, but the specifics of how ESE affects an individual's intention to pursue entrepreneurial projects are yet to be largely explored (Newman et al., 2019).

Entrepreneurial characteristics

Entrepreneurial characteristics literature has enjoyed a resurgence and a notable rise towards a consistent groundwork, allowing the development of a more reliable framework and appropriate tools for measurement. Over the last decades, researchers explained entrepreneurial characteristics by applying mainly the Big-5 personality model. Additionally, some auxiliary characteristics have been added to this mix, such as risk propensity, locus of control, and innovativeness. Nowadays, although many researchers acknowledge the characteristics of entrepreneurs as important behavior traits that set entrepreneurs apart from non-entrepreneurs, little has been made to identify a full set of characteristics that define entrepreneurs as a group and to consolidate its nomenclature (Campos et al., 2021; Moraes et al., 2018; Ozaralli & Rivenburgh, 2016; Zhao et al., 2005). Some authors use the nomenclature of personality traits (Fragoso et al., 2020), which describes behavioral patterns in individuals whose main factors are the need for achievement, the internal locus for control, and the propensity to take risks (Fragoso et al., 2020). Other authors use the entrepreneurial nomenclature profile to identify the common characteristics and competencies found in individuals who act according to the entrepreneurial prerogatives reported in the literature (Iizuka & Moraes, 2014; Rocha & Freitas, 2014). Since the focus will be on more generic aspects of how entrepreneurs conduct themselves, this study adopts the term entrepreneurial characteristics, which is very similar to the entrepreneurial profile construct.

Entrepreneurial characteristics refer to an individual's attitudinal characteristics that can increase his chance of performing entrepreneurial actions compared to others (Moraes et al., 2018). In this respect, entrepreneurial characteristics represent the abilities and traits an entrepreneur needs to

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manage a project successfully (Atiya et al., 2019). However, since scholars have established different characteristics of entrepreneurs, a comprehensive review of the characteristics and behavior of entrepreneurs is still under development and out of this study's scope (Atiya et al., 2019; Bignotti & Le Roux, 2016; Krakauer et al., 2018). After that, the following seven attitudinal characteristics represent some of the most reported entrepreneurial characteristics: risk-taking, planning, opportunity recognition, persistence, sociability, innovation, and leadership.

Risk-taking refers to a greater inclination to take risks and how much the individual is predisposed to perform certain tasks to achieve the goal of starting a business (Schmidt & Bohnenberger, 2009). Planning can be defined as the preparation for the future, where the individual prepares to achieve goals (Schmidt & Bohnenberger, 2009). Studies have shown that opportunity recognition promotes entrepreneurial intention (Krakauer et al., 2018; Markman & Baron, 2003) since it involves the discovery of new means-end relationships and is seen as one of the main entrepreneurial characteristics that trigger entrepreneurial behavior (Vodă et al., 2020). Persistency is the ability to overcome obstacles (Krakauer et al., 2018). As established by Markman and Baron (2003), sociability represents social capital, which refers to the talent an individual carries within oneself to reinforce institutional ties, social networks, and contacts – generating ideas, solving demands, and identifying solutions creatively corresponds to innovation (Schmidt & Bohnenberger, 2009). And finally, leadership corresponds to involving individuals, positively influencing the pursuit of organizational goals (Krakauer et al., 2018).

These entrepreneurial characteristics are seen as an important predictor of entrepreneurial behavior, especially when considering the university context, as somewhat presented by Moraes et al. (2018). Given that entrepreneurial characteristics are among entrepreneurship's promising topics (Lopes & Lima, 2019) and there is a lack of consensus, further investigation on entrepreneurial characteristics is performed in this article.

Thus, we present the first research hypothesis with two sub-hypotheses:

- H1: There are significant differences in key behavioral predictors of entrepreneurial intention.
- H1a: Self-efficacy better explains entrepreneurial intention.
- H1b: Entrepreneurial characteristics better explain entrepreneurial intention.

Entrepreneurial education

Entrepreneurial education (EE) supports the creation of knowledge, competencies, and experiences that encourage entrepreneurial success in a variety of settings. Different studies on entrepreneurship education suggest that individuals who have entrepreneurship training and education are more likely to engage in new venture creation (Wibowo et al., 2019). Entrepreneurship education is often categorized using three different approaches: 1. *Educating about entrepreneurship* refers to a broader understanding of the education practices, a viewpoint oriented towards a more traditional comprehension or shared knowledge; 2. *Educating for entrepreneurship* enables participants to attain the necessary knowledge and key skills to become an entrepreneur. The preposition "for" highlights the tasks, projects, and activities that create supportive and stimulating learning; 3. *Educating through entrepreneurship* enables participants to go "*through*" an actual entrepreneurial learning process (Pittaway & Edwards, 2012; Rönkkö & Lepistö, 2015). In other words, entrepreneurial education reflects the educator's efforts to intervene in students'/participants' lives to influence their entrepreneurial skills and qualities (Vodă & Florea, 2019).

In terms of entrepreneurial intention, several studies positively link EE with a variety of entrepreneurship-related human capital assets and entrepreneurship outcomes (Aly et al., 2021; Martin et al., 2013; Jiatong et al., 2021). For instance, Asimakopoulos et al. (2019) state that EE favors entrepreneurship in the sense that when taking an entrepreneurship course, the individual has a greater entrepreneurial intention. Moreover, according to the authors, if an individual feels remarkably capable of creating a company due to their trust in their skills, the knowledge gathered brings greater relevance to EI.

Several pieces of research on entrepreneurship education have evidenced that sometimes EE can be negatively associated with entrepreneurship. For example, Oosterbeek et al. (2010) conducted a study on 562 university students from two main Dutch provinces and found that students had lower levels of intentions after entrepreneurship course completion. Notwithstanding, the impact of entrepreneurial education on the relationship between behavioral aspects and entrepreneurial intention could be favored further investigation (Aly et al., 2021; Chienwattanasook et al., 2019; Jiatong et al., 2021).

Thus, we present the second and third hypotheses of the research:

- H2: There are differences in the relationship between self-efficacy and entrepreneurial intention regarding students who studied entrepreneurship disciplines or not.
- H3: There are differences in the relationship between entrepreneurial characteristics and entrepreneurial intention regarding students who studied entrepreneurship disciplines or not.

CONCEPTUAL MODEL OF RESEARCH

A theoretical model was elaborated from the literature review and formulation of the hypotheses to meet our research purpose (Figure 1). As we mentioned previously, the paper aims to understand what behavioral aspect fits better in entrepreneurship intention models.

Figure 1

Conceptual model of research
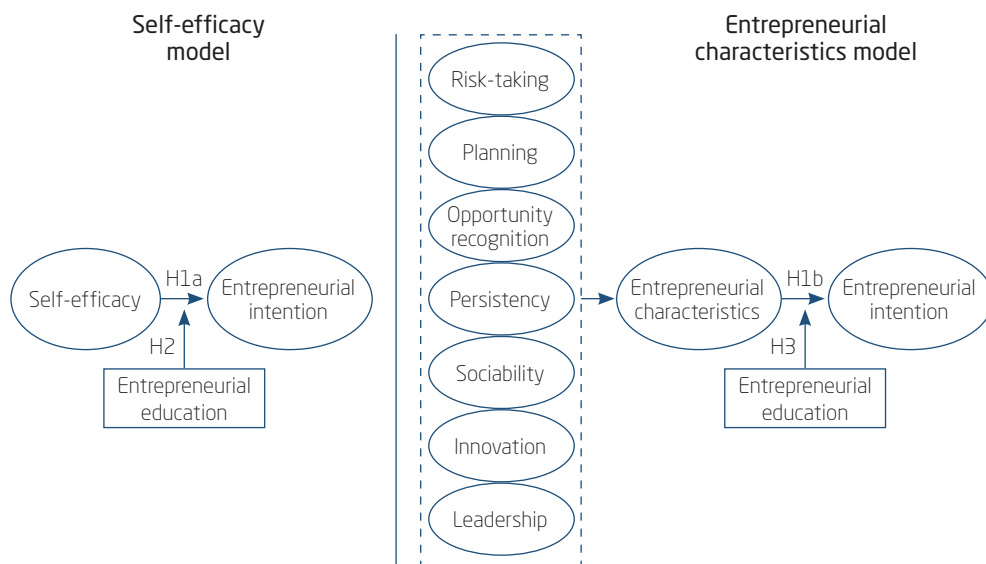
Source: Elaborated by the authors.

Entrepreneurial characteristics indicators used in the questionnaire were based on previous research (Krakauer et al., 2018; Markman & Baron, 2003; Moraes et al., 2018; Rocha & Freitas, 2014; Schmidt & Bohnenberger, 2009).

The questions regarding entrepreneurial intention were based on and adapted from Liñán and Chen (2009), Moraes et al. (2018), and Saeed et al. (2015). Lastly, self-efficacy indicators had as the main reference the study of Noble et al. (1999).

METHODOLOGICAL AND SAMPLE ASPECTS

The methodology used was quantitative, using Structural Equation Modeling of Partial Least Squares (PLS-SEM), considering that the objectives were to explain the constructs presented and identify the degrees of prediction. Also, one of the models presents one hierarchical latent variable, where entrepreneurial characteristics are a second-order construct constituted by first-order constructs (Hair et al., 2018). The classification of the hierarchical model is of the reflexive-formative type, where the constructs of the first order are considered reflexive, and the second order is considered formative (Becker et al., 2012). The statistical tests were operationalized with the SmartPLS 3.0 M3 software (Ringle et al., 2015).

This research considered university students from the Business Administration graduation course from five public and private educational institutions in two Brazilian states (Amazonas and Sao Paulo). Evidence suggests that most individuals plan to become entrepreneurs while relatively young (Shirokova et al., 2016; Vodă & Florea, 2019). Consequently, entrepreneurship among students represents an important area of research since entrepreneurial conscience, attitude towards entrepreneurship, and desired career path are formed at this stage of life (Shirokova et al., 2016). The choice of Brazilian university students relates to 1. the university's support and promotion of entrepreneurship may increase student's entrepreneurial intention in the same proportion (Asimakopoulos et al., 2019), and 2. the guidance in a resource-constrained reality might provide different results from previous studies performed in developed countries (Fischer, Moraes, & Schaeffer, 2019).

The research was conducted in a non-probabilistic way and with a convenience sample. First, we applied a pre-test to Business Administration students and did not make any changes related to the measures used in this study after the pre-test. After validating the questionnaire, which used a seven-point Likert scale, the application was carried out using the intercept research methodology, which significantly reduced the rate of questionnaires with incomplete answers (less than 2%). The questionnaire is presented in

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Appendix A. A single cross-section survey was conducted between May and July 2019 – the final sample comprised 1,004 sophomore, junior, and senior BA, students. Freshman students were not considered since there would be greater difficulties with the questions. In addition, interviewed students were all enrolled in night classes, which may mean a closer relationship with the market. In order to assure the anonymity of the respondents, any personal identification data were not collected.

For this research, only Business Administration course students from Amazonas and Sao Paulo were selected. In Brazil, the area of Business/Management courses has almost 50% of students with entrepreneurial intent in the coming years (Sieger et al., 2018) and is the most representative course in the country, containing 14.5% of all courses (INEP, 2017; Sieger et al., 2018). In addition, entrepreneurship programs were first introduced to Business Administration courses (Streeter et al., 2002). Thus, when investigating the perception of Administration students, it is possible to identify more effective and systematic ways to promote entrepreneurship in universities and, consequently, contribute to society with the placement or creation of new ventures (Matt & Schaeffer, 2018; Rocha et al., 2021).

Amazonas and São Paulo are in two different regions (North and Southeast, respectively), and the collection in these different contexts can help in a more representative sample for Brazil. São Paulo is one of the most important metropolitan regions in the country (Fischer, Schaeffer, & Queiroz, 2019), contributing to 53.17% of the GDP, the largest contributor in the country (SEDECTI, 2018). 25% of the 2,448 education organizations in Brazil are concentrated in São Paulo (INEP, 2017). Amazonas is an eccentric state that does not fit Brazil's high-growth entrepreneurship pattern (Rocha et al., 2021), it contributes to 5.38% of the GDP and is the 16th contributor (SEDECTI, 2018). In terms of educational systems, Amazonas has less than 1% of these organizations (INEP, 2017).

The sample size was evaluated using the G*Power 3.1 software (Faul et al., 2009). The minimum sample size calculated was 103 for a significance level of 5% and a statistical power of 0.8. The final sample size used was 1,004 people, suitable for estimation by PLS-SEM.

The sample comprised 58% of respondents from a private university and 42% from the public, all of them from the business administration course. 53% were women, the average age was 22, and 92% were single. 64% of the respondents had already taken entrepreneurship courses.

RESULTS DESCRIPTION AND ANALYSIS

The analysis of results is divided into five sections: confirmatory factor analysis, self-efficacy measurement model evaluation, entrepreneurial characteristics measurement model evaluation, structural model evaluation, and evaluation of fit measures.

Confirmatory factor analysis

Some indicators were adapted from other authors, so a confirmatory factor analysis (CFA) was necessary before conducting the structural equation modeling. The indicators with factor loads above 0.7 were maintained in the model. The indicators with factor loads between 0.4 and 0.7 were analyzed according to the impact of the exclusion on the composite reliability and the extracted average variance (Hair et al., 2019). Thus, SE1, RT4, IN3, LI1, PE2, PL1, and SO1 indicators were excluded. The results of the CFA are presented in Table 1.

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Table 1

Confirmatory factor analysis

Questions	Mean	Standard deviation	Standardized path loading	Critical ratio	P-value
Self-efficacy					
(SE1) I can work productively, regardless of stress, pressure and conflict (excluded).	4.363	1.804	-	-	-
(SE2) I can originate new ideas and products.	5.304	1.260	0.714	33.363	0.000
(SE3) I can develop and maintain favorable relationship with potential investors.	5.344	1.259	0.773	49.026	0.000
(SE4) I can see new market opportunities for new products and services.	5.056	1.299	0.783	48.840	0.000
(SE5) I can recruit and train company's employees.	4.620	1.544	0.630	21.353	0.000
(SE6) I can develop a working environment that encourages people to try out something new.	5.336	1.210	0.681	24.975	0.000
Risk-taking					
(RT1) I would assume a long-term debt, believing in the advantages that a business opportunity would bring me.	4.281	1.718	0.740	29.918	0.000
(RT2) I admit taking risks in exchange for possible benefits.	4.972	1.388	0.709	27.008	0.000
(RT3) My decisions are not predominantly based on my comfort zone.	4.873	1.460	0.695	23.203	0.000
(RT4) I believe that getting involved in situations of higher risk will create results of great impact (excluded).	4.966	1.526	-	-	-
Opportunity recognition					
(OR1) I believe I have a good ability in recognizing business opportunities.	4.650	1.521	0.769	40.487	0.000

(continue)

Table 1 (continuation)
Confirmatory factor analysis

Questions	Mean	Standard deviation	Standardized path loading	Critical ratio	P-value
Opportunity recognition					
(OR2) I believe I have the skill to understand, recognize and make use of abstract data, also implied and in constant modification.	4.424	1.731	0.770	37.584	0.000
(OR3) I am always up to any opportunity that may arise.	4.408	1.645	0.858	74.343	0.000
(OR4) I feel able to identify business opportunities and profit from them.	4.549	2.132	0.653	9.619	0.000
Innovation					
(IN1) I prefer a job full of novelty instead a routine activity.	5.373	1.514	0.776	39.860	0.000
(IN2) I like changing my way of work whenever possible.	4.925	1.418	0.714	25.763	0.000
(IN3) I like improving the conventional and correct way of activities, not strictly following steps (excluded).	4.996	2.110	-	-	-
(IN4) I bet on creativity while elaborating projects/activities.	5.259	1.352	0.728	30.03	0.000
Leadership					
(L1) I am often chosen as a leader in school or professional activities (excluded).	4.593	1.606	-	-	-
(L2) People respect my opinion.	5.264	1.207	0.712	31.736	0.000
(L3) I can convince people to overcome conflicts and work as a team to achieve a particular result.	5.134	1.319	0.714	28.172	0.000
(L4) I can encourage people to perform tasks for which they are unmotivated.	5.162	1.242	0.737	37.176	0.000
(L5) Frequently, people ask my opinion regarding wok or study issues.	5.107	1.386	0.721	31.402	0.000

(continue)

Table 1 (continuation)
Confirmatory factor analysis

Questions	Mean	Standard deviation	Standardized path loading	Critical ratio	P-value
Persistency					
(PE1) Professionally, I consider myself more persistent than others.	5.047	1.342	0.697	28.331	0.000
(PE2) I can work in projects intensely with a risk of depriving my social life, even if the project has uncertain outcome (excluded).	4.695	1.511	-	-	-
(PE3) I'm capable of creating, conducting and implementing new life plans.	5.159	1.283	0.788	47.540	0.000
(PE4) Every chance I have, I evaluate myself considering perseverance, imagination and creativity.	4.589	1.764	0.657	22.849	0.000
Planning					
(PL1) I always plan everything I do very carefully (excluded).	5.044	2.141	-	-	-
(PL2) To achieve my goals, I detail all the steps to be followed.	4.875	1.552	0.759	35.324	0.000
(PL3) I know I can set my short, medium and long-term goals.	5.137	1.308	0.711	28.497	0.000
(PL4) I like to set goals and targets to feel challenged.	5.215	1.486	0.744	32.488	0.000
Sociability					
(S01) The social contacts that I have are very important for my personal life (excluded).	5.479	1.856	-	-	-
(S02) I know several people who could assist me professionally, if I needed it.	5.296	1.533	0.607	16.840	0.000
(S03) I relate very easily with other people.	5.173	1.519	0.767	37.978	0.000
(S04) I try to maintain constant contact with people in my network.	4.796	1.650	0.781	47.334	0.000

(continue)

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Table 1 (conclusion)
Confirmatory factor analysis

Questions	Mean	Standard deviation	Standardized path loading	Critical ratio	P-value
Entrepreneurial intention					
(EI1) I am ready to do whatever it takes to be an entrepreneur.	4.431	1.878	0.795	55.363	0.000
(EI2) Even though I work for other companies, I will never abandon my dream of opening my business.	4.450	1.821	0.802	56.528	0.000
(EI3) My greatest achievement will be to have my own business.	4.792	1.796	0.862	80.358	0.000
(EI4) I will make every effort to create and maintain my own company.	4.301	1.928	0.883	87.066	0.000
(EI5) I intend to start a business in the coming years.	4.188	2.029	0.855	81.244	0.000

Source: Elaborated by the authors.

Note: Likert scale responses from 1 (totally disagree) to 7 (totally agree). The students responded with how much they agreed with the statements.

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Self-efficacy measurement model evaluation

The self-efficacy model presents two reflective constructs, and the evaluated criteria were: internal consistency, composite reliability, convergent validity, and discriminant validity (Hair et al., 2019). Internal consistency was assessed by composite reliability, which evaluates whether the indicators associated with each construct actually represent them. The composite reliability values should be at least 0.70 to indicate that the items are sufficient to represent their respective constructs (Hair et al., 2019). The average variance extracted (AVE) is one of the criteria for testing the convergent validity of a construct (Fornell & Larcker, 1981). AVE values higher than 0.50 are acceptable to indicate that a large amount of the mean variance of the indicators is captured by each factor and not by the measurement error (Hair et al., 2019). All the mentioned values are within the ones established by the authors (Table 2).

Table 2 also presents the correlation between the latent variables and the square root of the average variance extracted, which is presented in bold on the diagonal. This value must be greater than the correlation between latent variables (Fornell & Larcker, 1981). According to the results, no correlation value between the latent variables is higher than the values of the square root of the extracted mean-variance (diagonal), thus indicating that the values are adjusted.

Table 2

Evaluation of measurement — self-efficacy model

Construct	Entrepreneurial intention	Self-efficacy
Entrepreneurial intention	0.840	
Self-efficacy	0.400	0.715
Composite reliability	0.923	0.838
Average variance extracted (AVE)	0.705	0.512

Source: Elaborated by the authors.

Note. The heterotrait-monotrait ratio of self-efficacy and entrepreneurial intention is 0.456.

Entrepreneurial characteristics measurement model evaluation

The two-stage approach was used to estimate the entrepreneurial characteristics model. This approach is appropriate when the interest is in the

relationships of the second stage. It presents a more parsimonious model, as the relationships of the first stage do not need to be represented in the interpretation of the results (Becker et al., 2012).

In the primary stage, a model is formed by linking the constructs that form the entrepreneurial characteristics directly to the EI, and the scores for the latent variables are obtained. Subsequently, in the second stage, the scores obtained are used as indicators that form a new construct called entrepreneurial characteristics.

Table 3 presents the same indicators as Table 2 but for the first-order analysis of the entrepreneurial characteristics model. All the mentioned values are within the ones established by the authors (Hair et al., 2019).

Table 3

Evaluation of measurement – entrepreneurial characteristics first order model

Constructs	RT	OR	EI	IN	L	PE	PL	SO
Risk-taking	0.731							
Opportunity recognition	0.262	0.766						
Entrepreneurial intention	0.435	0.372	0.84					
Innovation	0.366	0.277	0.339	0.74				
Leadership	0.312	0.287	0.279	0.372	0.712			
Persistency	0.389	0.36	0.455	0.444	0.548	0.713		
Planning	0.306	0.24	0.195	0.289	0.466	0.491	0.729	
Sociability	0.282	0.33	0.219	0.321	0.528	0.481	0.394	0.721
Composite reliability	0.774	0.849	0.923	0.784	0.802	0.751	0.772	0.765
AVE	0.534	0.586	0.706	0.547	0.507	0.508	0.532	0.520

Source: Elaborated by the authors.

The convergent validity, collinearity, statistical significance, and relevance of the formative construct (entrepreneurial characteristics) were evaluated. This analysis is already part of the second stage. The convergent validity was estimated from the value of the formative construct's path coefficient. Path coefficient values greater than 0.8 support the convergent validity of the formative construct (Hair et al., 2019). The value of the second-order level construct path coefficient, entrepreneurial characteristics, was 0.802, supporting the convergent validity of the construct. The value of the variance

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inflated factor (VIF) was used to assess the colinearity of the construct, and the values were within the acceptable range (below 5), according to Hair et al. (2019).

Statistical significance was assessed using the bootstrapping technique, and the relative importance of each item was analyzed and was significant, with empirical support to maintain all indicators in the model (Hair et al., 2019).

Structural model evaluation

The structural models (Figure 1) were evaluated to provide consistent evidence that self-efficacy and entrepreneurial characteristics positively influence entrepreneurial intention. The criteria used to evaluate the structural model were: collinearity, significant factor loadings, structural coefficients, and coefficient of determination of the model (R^2).

In order to evaluate collinearity, the values of the VIF for each subpart of the structural model were analyzed. All values are within the range established by Hair et al. (2019), below 5.

The bootstrapping technique was used to analyze structural coefficients and factor loads using student's t-statistic (Efron & Tibshirani, 1998; Hair et al., 2019). Table 4 presents the T values for the relationship in the models.

Table 4

Coefficients of the structural models – between constructs

Path	Sample mean	Standard deviation	T-statistics	P-values
Self-efficacy → Entrepreneurial intention	0.401	0.028	14.228	0.000
Entrepreneurial characteristics → Entrepreneurial intention	0.582	0.023	25.273	0.000

Source. Elaborated by the authors.

Results indicate that the relationship between self-efficacy and entrepreneurial intention and between entrepreneurial characteristics and entrepreneurial intention is significant. These results are in line with the entrepreneurial intention literature.

A multigroup analysis was performed with both models to test whether the models could identify differences in groups of students who studied entrepreneurship subjects or not.

Table 5 presents the analysis results of the relationships among groups of respondents.

Table 5

Relationship analysis – entrepreneurship disciplines

Path	Self-efficacy model		Entrepreneurial characteristics model	
	Path coefficients – difference (discipline – NO *versus* YES)	P-values	Path coefficients – difference (discipline – NO *versus* YES)	P-values
Self-efficacy → Entrepreneurial intention	0.043	0.210	–	–
Entrepreneurial characteristics → Entrepreneurial intention	–	–	0.071	0.048

Source: Elaborated by the authors.

Differences between groups are evidenced only in the entrepreneurial characteristics model (Table 5), confirming hypothesis 3 and not confirming hypothesis 2. The effect is more strongly positive in the group that had not taken entrepreneurship disciplines. This outcome may have happened because we have analyzed a traditional discipline of entrepreneurship, addressing only the learning "about" entrepreneurship and not considering the dimensions of "for" with tasks and projects to acquire skills, nor the "through" with entrepreneurship practices, as suggested by Pittaway and Edwards (2012).

The analysis of the coefficient of determination (R^2) considered values of 2%, 13%, and 25% as small, medium, and large effects, respectively (Cohen, 1988; Faul et al., 2009). According to the analyses, the entrepreneurial intention presented an R^2 of 0.160 in the self-efficacy model, considered medium, and an R^2 of 0.336 in the entrepreneurial characteristics model, considered large.

In addition, to evaluate the magnitude of R^2 values as a criterion of predictive accuracy, the Q^2 value was also evaluated, which is an important indicator of the model's predictive relevance. When a PLS-SEM model has predictive relevance, it accurately predicts the data points of the indicators in reflective measuring models. Table 6 presents the values of R^2, adjusted R^2, and Q^2.

Table 6

Results of the values of R^2 and Q^2

Construct	Self-efficacy model			Entrepreneurial characteristics model		
	R square	R square adjusted	Q^2	R square	R square adjusted	Q^2
Entrepreneurial intention	0.160	0.159	0.104	0.336	0.335	0.221

Source: Elaborated by the authors.

The complete model resulting from both models is presented in Figure 2.

Figure 2

Complete empirical models
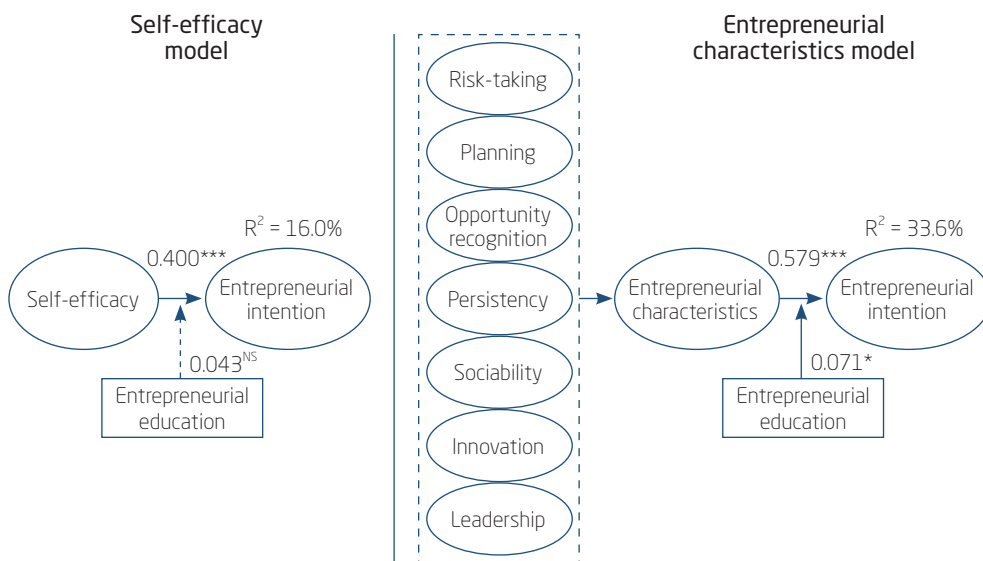
Source: Elaborated by the authors.

Note. * = significant at 5%; ** = significant at 1%; *** = significant at 0.1%; NS = not significant.

Evaluation of fit measures

In order to reinforce the results obtained, the adjustment measures presented by the SmartPLS 3 software were analyzed for each of the two models tested.

One of the measures analyzed was the standardized root mean square (SRMR), which is a measure that uses the quadratic discrepancy between

the observed and implicit correlations, and the value must be less than 0.08 (Henseler et al., 2014). The second adjustment indicator analyzed was the normal adjustment index (NFI) or Bentler-Bonett index, which are the measures of the x^2 value of the proposed model concerning that of the null model (Lohmöller, 1989) and must be greater than 0, 95 (Byrne, 2016). The third measure was the root mean square residual cover (RMStheta), which is a measure of the degree to which the residual of the external model is correlated (Lohmöller, 1989) and must be less than 0.14 (Henseler et al., 2014). And the last measure analyzed was the exact fit test of the model (e.g., square Euclidean distance – d_ULS), which is based on bootstrapping for significant discrepancies between the covariance matrices observed and implicit in the model, where the result should not be significant.

According to the results (see Table 7), the indicators are adequate from those established by the authors, except for the NFI for the self-efficacy model. Thus, it is possible to prove that the entrepreneurial characteristics model fits the data properly and that its fit is slightly better than a model using only the first-order level constructs.

Table 7

Evaluation of fit measures

Fit measures	Self efficacy model	Entrepreneurial characteristics model
SRMR	0.074	0.031
NFI	0.894	0.965
RMStheta	0.146	0.140
d_ULS	0.303	0.076

Source: Elaborated by the authors.

According to the results presented, it is possible to state that the entrepreneurial characteristics construct fits better than the self-efficacy construct in entrepreneurial intention models. Thus, the main research hypothesis (H1) was confirmed, as well as H1b.

DISCUSSION

Although entrepreneurial characteristics and self-efficacy have been used to forecast intention, further research needs to be conducted to explore

which is the most appropriate antecedent for measuring entrepreneurial intention, as suggested by Newman et al. (2019) and Moraes et al. (2021). This study contributes to the literature by identifying the behavioral aspect (self-efficacy or entrepreneurial characteristics) that fits better as an entrepreneurship intention influencer. Additionally, entrepreneurial education was used as a control variable in a multigroup analysis. Individuals that encountered entrepreneurial education and the ones that didn't were assessed. The empirical research was developed using PLS-SEM data analysis to a sample of 1,004 university students from Brazil. Accordingly, we present two consistent models. The entrepreneurial intention construct showed an R^2 of 0.160 in the self-efficacy model, considered medium, and an R^2 of 0.336 in the entrepreneurial characteristics model, considered high. Regarding the multigroup analysis of entrepreneurial education, when using the entrepreneurial characteristics models, the difference amongst these groups was demonstrated, which didn't happen in the entrepreneurial self-efficacy model. Thus, the entrepreneurial characteristics model enables a better interpretation of other factors that influence entrepreneurial intention when compared to the entrepreneurial self-efficacy model.

Results confirmed the positive influence of self-efficacy and entrepreneurial characteristics on entrepreneurial intention. This result is aligned with previous investigations that explored self-efficacy (Moraes et al., 2021; Saeed et al., 2015) as well as entrepreneurial characteristics (Atiya et al., 2019; Campos et al., 2021; Moraes et al., 2018; Rocha et al., 2021; Vodă & Florea, 2019).

Based on the results obtained using data from 1,004 Brazilian students, we can draw two main contributions. First, we demonstrate that it seems more appropriate to use a set of entrepreneurial characteristics when investigating an entrepreneurial intention model than to use a self-efficacy construct if you are looking for a higher explanatory factor and a more robust model. This result is opposite to what is suggested by several references in the entrepreneurship literature, which establishes self-efficacy as a key construct (e.g., Fragoso et al., 2020; Menon et al., 2020; Moraes et al., 2021). Nevertheless, the self-efficacy construct presented statistical validity regarding its influence on entrepreneurial intention. So if you are looking for a model to measure EI with a much smaller number of questions, the ESE construct may represent an interesting alternative according to the scope of the research project. Second, we demonstrate that the model's sensitivity to moderators is an important element when choosing the EI antecedents to be used in a model. This is particularly important in the entrepreneurial intention models' context. The path through which intentions evolve can vary

systematically, and the same scale can consistently measure different things for different people (Krueger, 2009). Only in the model that considered entrepreneurial characteristics was it possible to verify a significant difference in the relationship with the entrepreneurial intention among the students who had taken entrepreneurship disciplines. And the importance of entrepreneurial education for entrepreneurial intention has already been proven in the literature (Aly et al., 2021; Jiatong et al., 2021). In this sense, the result shows that the sensitivity with moderators of the entrepreneurial characteristic model is greater.

Regarding considering the Brazilian context, the result is consistent with the 2019-2020 reports of the GEM, which indicates that Brazilians consider themselves innovative (Bosma et al., 2020). The fact that Brazil is a developing country with a high rate of early-stage entrepreneurial activity increases the importance of using the most effective practices to promote entrepreneurship and implement entrepreneurial education according to the needs of students. This is especially important because currently Brazilian universities should improve their structures to support entrepreneurship since the number of incubators, entrepreneurship centers, access to investors, events, and other forms of support are limited when compared to other Latin American countries (ANPROTEC, 2016; Endeavor, 2017). Brazilian universities also lack a strategic orientation for entrepreneurship, as well as an institutionalization of entrepreneurial culture (Campos et al., 2021; Moraes et al., 2021).

CONCLUSION

The study offers an in-depth perspective on which behavioral characteristics fit better into models of entrepreneurial intention and helps to fill a theoretical and practical gap in the need for university education to increase its positive impact on human capital (Nowiński et al., 2019), demonstrating which characteristics are most impacted by entrepreneurial education. In this way, entrepreneurial education can be planned to shape certain characteristics through actions in the university environment, making it possible to measure each initiative's impact on students' entrepreneurial aspects.

For example, in the case of the sample used for this research, the results of the outer weights for the second-order indicators were as follows: risk-taking = 0.470; opportunity recognition = 0.358; innovation = 0.155; leadership: 0.028; persistency = 0.529; planning = -0.162; and sociability = -0.127. These results indicate that the characteristics that need to be improved are

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mainly planning, sociability, and leadership, and actions can be planned considering this deficiency. In light of these findings, this research offers valuable insights for policymakers and academics who deliver and evaluate educational policy. As a result, decision-makers may rethink the current educational program and implement programs that will develop students' planning, sociability, and leadership capacities.

The study, developed as such, contributes to understanding entrepreneurial intention's influencers and brings complementary reflections on entrepreneurship behavioral aspects and their relationship with EI.

The developed approach has some limitations that should be addressed for further studies: 1. a non-probabilistic sample was used; 2. entrepreneurial characteristics literature is still evolving; thus, there might be characteristics not considered in this research; 3. student's perception was assessed, so there is a subjectivity that needs to be considered; 4. the results of the study cannot be generalized, as the study involves only five universities from Brazil and only business administration course; and, also, 5. despite literature establishment of a connection between behavioral aspects and entrepreneurial intention, intentionality doesn't, necessarily, lead to actual behavior.

Besides the limitations, some possibilities for future research are: expand this line of research and consider other contextual factors to provide a complete theoretical model to explain entrepreneurial behavior; using a more diversified sample of students; validate the theoretical model presented with more focus groups; test the difference between groups (example: programs and genders); and qualitative assessments on these matters in order to provide in-depth perspectives on such relationships.

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