

METACOGNIÇÃO E INTENÇÃO EMPREENDEDORA: EVIDÊNCIAS EM UNIVERSITÁRIOS

METACOGNITION AND ENTREPRENEURIAL INTENTION: EVIDENCE FROM UNIVERSITY STUDENTS

RICARDO BUENO

UNIFESP

HELOISA CANDIA HOLLNAGEL

UNIFESP

SIBELLY RESCH

UFMS - UNIVERSIDADE FEDERAL DE MATO GROSSO DO SUL

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Objetivo do estudo

Propor e testar um modelo integrando conhecimento de metacognição (MK) e experiência (ME) como preditores indiretos de intenção empreendedora (EI), via controle comportamental percebido (PBC) e atratividade pessoal (PA) ao empreendedorismo.

Relevância/originalidade

Amplia o escopo da Teoria do Comportamento Planejado (TPB) ao incluir dimensões metacognitivas, diferenciando conhecimento e experiência como caminhos distintos de influência. Analisa um contexto de uma economia emergente, contribuindo para a compreensão de fatores cognitivos e sociais na formação da intenção.

Metodologia/abordagem

Estudo quantitativo com delineamento transversal. Dados coletados de 336 estudantes universitários do centro-oeste e sudeste do Brasil. Utilizou-se Modelagem de Equações Estruturais baseada em covariância (CB-SEM) para testar hipóteses.

Principais resultados

O modelo mostrou-se robusto ($R^2=46,20\%$), todas hipóteses confirmadas. O controle comportamental percebido (PBC) foi o principal preditor da intenção empreendedora. O conhecimento metacognitivo influenciou positivamente a PBC; a experiência metacognitiva afetou a PA. As normas subjetivas tiveram um forte efeito na EI.

Contribuições teóricas/metodológicas

Este estudo contribui ampliando o escopo do TPB para incluir dimensões metacognitivas da EI. A diferenciação entre conhecimento metacognitivo e experiência enriquece os modelos baseados em TPB. Fornece aplicação metodológica do CB-SEM em uma amostra multi-institucional, apoiando a validade externa do modelo.

Contribuições sociais/para a gestão

Sugere que programas de educação empreendedora combinem fortalecimento técnico, estímulo à atratividade e aplicação prática de estratégias metacognitivas. Políticas públicas e instituições de ensino podem criar ecossistemas que transformem intenções em empreendimentos reais, fortalecendo redes de apoio e engajamento emocional.

Palavras-chave: Metacognição, Intenção Empreendedora, Teoria do Comportamento Planejado, Educação empreendedora educação, Modelagem de Equações Estruturais

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Study purpose

To propose and test a model integrating of metacognition knowledge (MK) and experience (ME) as indirect predictors of entrepreneurial intention (EI), via perceived behavioral control (PBC) and personal attraction (PA) to entrepreneurship.

Relevance / originality

Expands the Theory of Planned Behavior (TPB) by including metacognitive dimensions, distinguishing knowledge and experience as different paths of influence. Analyzes an emerging economy context, contributing to the understanding of cognitive and social factors shaping entrepreneurial intention.

Methodology / approach

Quantitative, cross-sectional study. Data collected from 336 university students in Midwest and southeastern Brazil. Covariance-based Structural Equation Modeling (CB-SEM) was employed to test hypotheses.

Main results

The model had robust explanatory power ($R^2=46.20\%$), with all four hypotheses confirmed. Perceived behavioral control (PBC) was the strongest predictor of entrepreneurial intention. Metacognitive knowledge positively influenced PBC; metacognitive experience affected personal attraction. Subjective norms had a strong effect on entrepreneurial attitudes.

Theoretical / methodological contributions

This study contributes by broadening the scope of TPB to include metacognitive dimensions of EI. Differentiating between metacognitive knowledge and experience enriches TPB-based models. Provides methodological application of CB-SEM in a multi-institutional Brazilian sample, supporting the external validity of the proposed model.

Social / management contributions

Suggests that entrepreneurship education should combine technical skills development, foster personal attraction and apply metacognitive strategies in practice. Public policies and educational institutions can create ecosystems that transform intentions into ventures, strengthening support networks and emotional engagement.

Keywords: Metacognition, Entrepreneurial Intention, Theory of Planed Behavior, Entrepreneurship education, Structural Equation Modeling

METACOGNITION AND ENTREPRENEURIAL INTENTION: EVIDENCE FROM UNIVERSITY STUDENTS

1 Introduction

Entrepreneurship plays an essential role in economic development by creating innovations, promoting efficiency improvements and setting up new jobs. According to Shane and Venkataraman(2000), entrepreneurship research is concerned with the nature of individual opportunities to goods and services, for new products (or markets), processes, sources, or types of organizations. Based on the fact that human behavior is considered to be determined by thought and planning, Theory of Planned Behavior (TPB) from Ajzen (1991, 2002) is an essential model on research of Entrepreneurial intention (EI). Entrepreneurial cognition (EC) in this context refers to the mental processes associated with identifying opportunities, evaluating risks, and conceptualizing business plans (Mitchell et al., 2007).

In emerging economies, EI is particularly relevant in the face of structural challenges such as youth unemployment and low productivity(Amorós et al., 2022). TPB postulates that attitudes towards behavior (ATB), subjective norms (SN), and perceived behavioral control (PBC) are direct predictors of intention and is widely used to investigate the decision to undertake in different cultural contexts(Ajzen, 1991; Liñán & Chen, 2009). However, recent studies have drawn attention to the importance of incorporating cognitive and metacognitive dimensions, capable of capturing the complexity of the entrepreneurial decision-making process(Haynie & Shepherd, 2009; Urban, 2012).

Metacognition, understood as the ability to monitor, evaluate, and regulate one's own mental processes(Flavell, 1979), is particularly relevant in entrepreneurship because it favors adaptability in uncertain contexts(Haynie et al., 2010). Among its dimensions, metacognitive knowledge (MK) refers to the understanding of people, tasks, and strategies, while metacognitive experience (ME) involves the conscious use of intuitions, emotions, and past experiences in decision-making(Haynie & Shepherd, 2009).

Research indicates that metacognitive knowledge strengthens PBC by increasing confidence in one's ability to start and run a business(Bagheri & Pihie, 2015; Haynie & Shepherd, 2009). Metacognitive experience, on the other hand, tends to positively influence personal attraction (PA) – equivalent to the favorable attitude toward entrepreneurship in TPB – through increased intuitive confidence and the evocation of positive emotions associated with success(Liñán, 2008; Michaelis et al., 2021). At the same time, subjective norms reflect perceived social pressure to adopt a certain behavior(Ajzen, 2002; Fekadu & Kraft, 2002), playing a relevant role in the formation of entrepreneurial attitudes, especially in contexts where social capital and the support of the network of relationships have significant weight(Abbas et al., 2020).

Therefore, the present study proposes an integrative model that combines central constructs of TPB with metacognitive dimensions, expanding the explanatory power of EI in Brazil as an example of an emerging economy context. Using structural equation modeling (SEM) with data from 336 Brazilian university students, we tested the relationships between metacognitive knowledge and experience, subjective norms, personal attraction, perceived behavioral control and Entrepreneurial intention. In doing so, we seek to contribute to theoretical advancement by integrating cognitive and social variables in the

same framework and offering practical subsidies for the design of entrepreneurial education programs and public policies aimed at stimulating business activity in the region.

2 Theory and Hypotheses

2.1 Metacognitive knowledge and perceived behavior control

Metacognitive knowledge is the capability that one's having to be conscious to the extension that knows oneself, others, tasks, and strategies when engaging in the process of making multiple decisions. Alternatively, it refers to the ability to acquire information concerning specific activity (i.e. write plans or calculate cash flows) this knowledge of the tasks influences how information is used in various contexts or objectives (Haynie & Shepherd, 2009). Moreover, the metacognitive knowledge of strategy refers to procedures for ensuring that a cognitive strategy is appropriate for achieving some desired goal (Haynie et al., 2010).

In the context of entrepreneurship research, individuals with a higher level of metacognitive knowledge can manage their strengths and weaknesses, identify opportunities, and adapt their strategies. Furthermore, handling their capacity to reflect on and regulate their cognitive processes to make informed decisions, and ultimately improving their chances of success in venture creation and management (Haynie & Shepherd, 2009)

Contemporary research about perceived behavioral control (PBC) role in entrepreneurship studies largely stems from the systematic research conducted by Bandura and his collaborators, which have demonstrated that people's behavior is strongly influenced by confidence in their ability to perform a task (self-efficacy). Additionally self-efficacy beliefs affect how to plan activities and the effort to conduct them (Bandura, 1977).

The theory of planned behavior conceives that self-efficacy is intricately connected to the process of role identification. Consequently, an entrepreneur's metacognitive knowledge is likely to improve their perceived behavioral control (PBC), as it makes a sense of confidence in their ability to execute the role effectively.

H1: Metacognitive knowledge (people, tasks and strategy) has a positive effect on perceived behavior control

2.2 Metacognitive experience and personal attraction

The metacognitive experience, consists to the extent the individual relies on personal experiences, emotions and intuitions employed as resources in a given process of making sense of multiple decisions or courses of actions (Haynie & Shepherd, 2009). It's important to note that knowledge and experiences can only be understood as metacognitive experiences when the individual has an awareness of how that experience relates to formulating a strategy to process the task at hand, allowing entrepreneur to draw knowledge (Haynie et al., 2010).

Contemporary research has linked metacognitive experiences to strategic mindset as driver to boost innovation and effort (Michaelis et al., 2021), nurturing reflection and social capital jointly support better opportunity evaluation and decision-making in early-stage

ventures (Bastian & Zucchella, 2022) and as a significant predictor of entrepreneurial intention more so than other metacognitive dimensions (Urban, 2012).

The attitude towards behavior is the second in importance of the three key predictors of the TPB. Entrepreneurship relies on the idiosyncratic perception of the outcomes of such experience (C. Schlaegel & M. Koenig, 2014). Personal attraction is defined as an individual's positive attitude toward entrepreneurship and was found to be a strong and significant predictor of entrepreneurial intention (Liñán, 2008).

Thus, metacognitive experience intensifies intuitive confidence by fortifying the sense of feeling *what needs to be done* (Haynie et al., 2010), evoking positive emotions related to positive outcomes of decision making boosting the engagement with entrepreneurship reinforcing experience having a direct and positive effect on personal attraction (Liñán, 2008; Liñán & Chen, 2009).

H2: Metacognitive experience (intuition, emotion and experience) has a positive effect on personal attraction (personal attitudes and intentions towards entrepreneurship)

2.3 Subjective norm and personal attraction

Ajzen's TPB elucidates human behavior using three principal variables as mentioned previously: Attitude Toward Behavior (ATB), Perceived Behavioral Control (PBC), and Subjective Norms (SN) (Ajzen, 1991, 2002). In this context, SN may signify the perceived social pressure to engage in or refrain from specific conduct (Fekadu & Kraft, 2002).

Social pressures can be driven by two main aspects: injunctive norms, which are the expectations of obtaining social approval or avoiding disapproval (for example, SN), and descriptive norms, which are the beliefs that if most people are doing something, it is a good or acceptable choice.

According to Social Norms Theory (Perkins & Berkowitz, 1986), people's actions are influenced by their perceptions of the beliefs and behaviors of others in their social groups or communities. This is consistent with the way social pressure affects behavior. In the context of entrepreneurship, this indicates that both explicit societal expectations and the observation of others' behaviors can profoundly impact entrepreneurial intentions.

Examining entrepreneurial intentions among 722 Malaysian university students under the Theory of Planned Behavior lens (Bagheri & Pihie, 2015), the study highlights that personal attraction and perceived behavioral control significantly shape their entrepreneurial intentions. Moreover, a system involving subjective norms and social valuation strongly affects students' personal attraction to entrepreneurship, emphasizing the importance of social support for entrepreneurial drive.

Regarding business students in Bangalore, India, Krithika and Venkatachalam (2014) showed that perceived social pressure, particularly from family, affects business aspirations, with parental entrepreneurial experience acting as a significant enabler. Further studies have shown that social norms contribute to 51.8% of the variance in entrepreneurial intent,

suggesting that affirmative and supportive norms substantially enhance students' entrepreneurial aspirations (Abbas et al., 2020).

Overall, when individuals perceive entrepreneurship positively and receive encouragement from close social circles, such as family and friends, their entrepreneurial intentions are more likely to be strengthened. These findings reinforce the fact that subjective norms, shaped by both injunctive and descriptive influences, are an essential determinant of entrepreneurial decision-making.

H3: Subjective norms (perceived social pressure) has a positive effect on personal attraction (personal attitudes and intentions towards entrepreneurship)

2.4 Personal attraction, perceived behavioral control and entrepreneurial intention

Theories predicting and explaining graduate students' inclination to start a business are becoming increasingly important as interest in the formation of entrepreneurial intent grows. As shown by Liñán (2009), subjective norms and attraction toward entrepreneurial activity are strongly connected to attitudes, which cognitive psychology defines as predispositions to respond positively or negatively toward an object (Ajzen, 1991, 2002). The attitude model outlines how change can be initiated by shaping individuals' thoughts, emotions, and behavioral intentions (Robinson et al., 1991). These attitudes act as key determinants in the formation of entrepreneurial intentions (Hannan et al., 2006).

Furthermore, Meta-analyses confirm TPB constructs reliably explain variance in intentions and behavior across domains; Entrepreneurship studies operationalize these constructs with strong psychometrics; TPB remains dominant due to parsimony, clarity, and cumulative evidence (Liñán & Chen (2009); Schlaegel & Koenig (2014)).

Shapero and Sokol's Entrepreneurial Event Model (EEM) highlights perceived desirability and feasibility, typically triggered by a displacement event. Bird (1988) defined intention as a purposive cognitive state. Comparative evidence shows TPB and EEM are compatible and predictive. Meta-analyses indicate personal attractiveness (desirability) and PBC (feasibility) are the strongest predictors, with effects stable across all studies.

Using Liñán and Chen's EIQ (2009) Maciel et al (2019), surveyed 315 non-business undergraduates at a Brazilian higher education institution, where subjective norms had the highest mean. All constructs correlated positively, and regression analysis showed that subjective norms and perceived behavioral control significantly increased entrepreneurial intention. A survey of 423 business undergraduates at Brazilian federal universities, analyzed using structural equation modeling, found that attitude and perceived behavioral control positively predict entrepreneurial intention. Subjective norms were nonsignificant overall but influenced early-phase students while not affecting those near graduation (Sousa et al., 2022).

Additionally, Souza, Silveira e Nascimento (2018) uses the EIQ and PLS-SEM with graduating students from two Brazilian federal universities to test personal attraction (PA) as a mediator. Descriptive and path analyses show PA was a strong predictor of entrepreneurial intention (EI), strengthened by 17% in this model. Perceived behavioral control significantly

increases PA, and PA mediates the effects of both $PBC \rightarrow EI$ and subjective norms $\rightarrow EI$, indicating EI is largely channeled through attitude rather than direct normative influence.

Thus, the literature grounded in TPB, suggests that personal attraction (attitude) reflects how appealing entrepreneurship is; stronger attraction should elevate intention.

H4a. Personal attraction positively affects entrepreneurial intentions.

Also, perceived behavioral control captures feasibility/self-efficacy from EEM; greater control should raise intention.

H4b. Perceived behavioral control positively affects entrepreneurial intentions.

3 Method

We employed a cross-sectional survey design gathering data from executives enrolled in an MBA course of a Brazilian business school to validate the proposed model that results are presented in Figure 1.

3.1 Sample

Data was collected with university students because they are close to making career related decisions and, therefore, provide a good population to examine entrepreneurial intentions (Krueger Jr et al., 2000). We opted for data collection of public opinion of higher education students to not predispose students' answers. The original items were translated from English into Portuguese then translated back into English to guarantee accuracy, and adapting the survey questionnaire to local jargon and testing it with university students before the final data collection. The data shown in Table 1 presents a description of the sample.

Table 1:

Sample descriptive data

Total		336
Gender	Female	172
	Male	162
	non-binary	4
Age	<24 yrs	219
	>24yrs	117

Source: Prepared by the authors

The final sample of this study consisted of 336 complete answers from anonymous students. The size of the sample far exceeds the minimum size of 161 specified by the Daniel Soper sample calculator (Soper, 2021), considering the number of latent variables. We also

observed the power of 0.8 and α of 0.05 (Hair et al., 2014), and an anticipated effect (F^2) of 0.3 (Cohen, 1998)¹.

3.2 Measures

We measured metacognition using third six items from Haynie & Shepard(2009). All items were measured on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree), e.g. “I try to use strategies that have worked in the past”, “I am good at organizing information” and “I depend on my intuition to help me formulate strategies”.

The others constructs were measured based a modified version of Liñán & Chen (2009) and Liñán (2008) to avoid potential bias of acquiescence the key items measuring constructs were randomly ordered. Thus, items A1 to A20 measure the four central constructs of the theory of planned behavior: Entrepreneurial intention (A4, A6, A9-reversed-, A13, A17 and A19-rev-), personal attraction (A2-rev-, A10, A12-rev-, A15 and A18), perceived behavioral control (A1, A5-rev-, A7, A14, A16-rev-, A20), and subjective norms (A3, A8, A11). All items consisted of a 7-point Likert scale, ranging from 1 (mostly disagree) to 7 (mostly agree).

Besides the above-mentioned constructs, we asked the students to report general information such as their age, gender and field of the course they were enrolled in.

3.3 Data analysis

To treat the data performed a structural equation model (SEM) analysis. The technique may involve a simultaneous evaluation of multiple variables and its relationships(Hair Jr et al., 2010). It eases finding and confirming the relations between multiple variables(Hair Jr et al., 2014). We used the software Lavaan package to treat the data(Rosseel, 2012).

4 RESULTS

By this methodology, the models are considered appropriate when, in addition to the appropriate phi and lambda matrices (Hair et al., 2014), they present the CFI, GFI, NFI adjustment indexes greater than 0.90 and the standardized RMR less than 0.05(Kline, 2005), and even when the RMSEA presents a coefficient less than 0.08 for a reasonable adequacy or less than 0.05 for a good adequacy(Browne & Cudeck, 1993). The figure 1 depicts model parameters indicators fell within the acceptability ranges ($\chi^2 = 92.7$, $p \leq 0,001$, 57 df, RMSEA = 0,04; CFI = 0,98; GFI = 0,99; NFI = 0,96; standardized RMR =0,04). Considering that, this sample gathers data from more than three hundred undergraduate students we consider a relevant sample with the indicator χ^2 / df (= 1.6).

¹ For the structural model evaluation, the analysis of the Pearson’s determinant coefficient (R^2) indicates the quality of the adjusted model. For Social Sciences it is generally classified as: $R^2=2\%$ for small effect, $R^2=13\%$ for medium effect and $R^2=26\%$ for a big effect (Cohen, 1988). The effect size (F^2) evaluates the usefulness of the construct to the model adjustment (Hair et al., 2014): 0.02 are small, 0.15 are medium and 0.35 are big. Medium size effect of 0.15, with power of 0.8 and α of 0.05 would be acceptable in management studies.

The Fornell-Larcker criterion is widely used to assess discriminant validity the AVE was also higher than the reference value 0.50 for all latent variables tested. As highlighted by Hair et al. (2014) this approach involves comparing the square root of the Average Variance Extracted (AVE) values with the correlations among latent variables. Specifically, the square root of each construct's AVE should exceed its highest correlation with any other construct.

Table 2:
Fornell-Larcker Criterion

Variable	EI	PA	PBC	SN	ME	MC
EI	0,777					
PA	0,172	0,900				
PBC	0,659	0,003	0,837			
SN	0,111	0,661	-0,002	0,714		
ME	0,108	0,532	0,027	0,668	0,921	
MC	0,248	0,008	0,375	-0,007	0,072	0,714
CR	0,722	0,894	0,823	0,881	0,918	0,665
AVE	0,604	0,809	0,701	0,714	0,849	0,510

Note: PCB (perceived behavior control); EI (entrepreneurial intention); PA (personal attraction); SN (subjective norms); ME (metacognitive experience) and MK (metacognitive knowledge).

Source: Prepared by the authors

Table 2 presents the evidence of discriminant validity, with the square root of the AVE values placed along the main diagonal and the correlation coefficients positioned off-diagonal. It can be observed that, for all dimensions analyzed, the square root of the AVE values is greater than the corresponding correlation coefficients in the lower-left portion of the matrix, thereby confirming the discriminant validity of the constructs (Hair et al., 2014). The Composite Reliability (CR) test was also higher than the reference value of 0.70, except for the metacognitive knowledge that we decide to keep as the scale were validated internationally (Haynie & Shepherd, 2009) and locally (Lima Filho & Bruni, 2015), confirming the convergent validity of the scale items and ensuring validity for the results calculated for the internal structural model (Valentini & Damásio, 2016). Table 3 depicts the descriptive residual covariances and correlations among study variables.

Structural model

Table 3 shows the hypotheses tests that support the structural model presented in Figure 1. The results support our four hypotheses. The supported hypotheses present the casual relation of metacognition resources (knowledge and experience) and social norms as precursors of perceived behavior control and personal attraction of entrepreneurial intentions of higher education students.

Table 3:

Descriptive residual covariances (lower triangle) and correlations (upper triangle) among study variables.

Variable	A02	IE0TO10	A10	A15	A07	A14	A03	A08	A11	ME1	ME2	MK01	MK02
A02	1,000	0,006	0,017	0,066	-0,004	0,021	-0,007	0,012	-0,023	-0,017	-0,011	-0,010	-0,068
IE0TO10	0,068	1,000	0,056	0,158	0,033	0,010	-0,013	0,026	0,025	-0,044	-0,074	-0,030	-0,014
A10	0,073	0,329	1,000	-2,98e-4	0,106	0,147	0,023	0,007	-0,048	0,009	0,012	0,099	0,006
A15	0,260	0,874	-0,001	1,000	0,069	0,154	0,016	-0,003	-0,053	-0,022	-0,037	0,068	0,007
A07	-0,010	0,168	0,357	0,223	1,000	1,000	-0,001	0,038	0,049	0,031	-0,073	-0,061	-0,041
A14	0,063	0,064	0,456	0,454	-0,003	-0,003	1,000	0,035	0,086	0,019	-0,016	-0,016	0,015
A03	-0,025	-0,066	0,096	0,061	0,116	0,116	0,099	1,000	-0,018	-0,002	0,030	0,027	-0,013
A08	0,046	0,141	0,028	-0,012	0,153	0,153	0,247	-0,068	1,000	0,044	-0,013	-0,006	-0,037
A11	-0,079	0,121	-0,174	-0,185	0,085	0,085	0,050	-0,005	0,148	1,000	-0,065	-0,047	-0,017
ME1	-0,066	-0,231	0,039	-0,087	-0,231	-0,231	-0,046	0,116	-0,048	-0,221	1,000	0,000	0,017
ME2	-0,043	-0,416	0,054	-0,159	-0,205	-0,205	-0,049	0,110	-0,026	-0,173	0,000	1,000	-0,005
MK01	-0,029	-0,110	0,306	0,202	-0,095	-0,095	0,032	-0,036	-0,104	-0,044	0,048	-0,015	1,000
MK02	-0,206	-0,054	0,018	0,023	0,089	0,089	0,050	0,121	0,053	-0,027	-0,028	-0,095	-0,003

Source: Prepared by the authors

Table 4:

Hypotheses tests

Path	Hypotheses	z-value	Standardized coefficients	p	R ² - Entrepreneurial Intention
PBC > EI	H4b	5,83	0.658	<.001	46,20%
PA > EI	H4a	2,94	0.170	.003	
SN > PA	H3	7,72	0.552	<.001	
ME > PA	H2	2,38	0.163	.017	
MK > PBC	H1	3,59	0.375	<.001	

Note: PCB (perceived behavior control); EI (entrepreneurial intention); PA (personal attraction); SN (subjective norms); ME (metacognitive experience) and MK (metacognitive knowledge).

Source: Prepared by the authors

The hypothesis test result using CB-SEM showed a p-value of less than 0.05, validating all the hypotheses according to the cut-off point discussed in the relevant academic literature (Hair Jr et al., 2010). Although validated, the hypothesis with the greatest explanatory power was hypothesis H4b, the explanatory percentage was 65,8%. This implies that the "perceived behavior control" formed by "metacognitive knowledge", a percentage considered high for social sciences, which already treats values above 35% as high (Cohen, 1998). Similarly, H3 is strongly influenced by a Beta of ,745 of "social norms" on "personal attraction." For this relationship, the explanatory percentage was 55,2%.

H4b, with a beta of only 0.172, even though it was statistically significant with a p-value of less than 0.003, showed an influence considered to be of: 17.0%, This value is considered medium effect even for studies in the social sciences (Cohen, 1988; Cohen et al., 2003). The result shows that for students, personal attraction has relatively low force on entrepreneurial intention of higher education students than perceived behavior control.

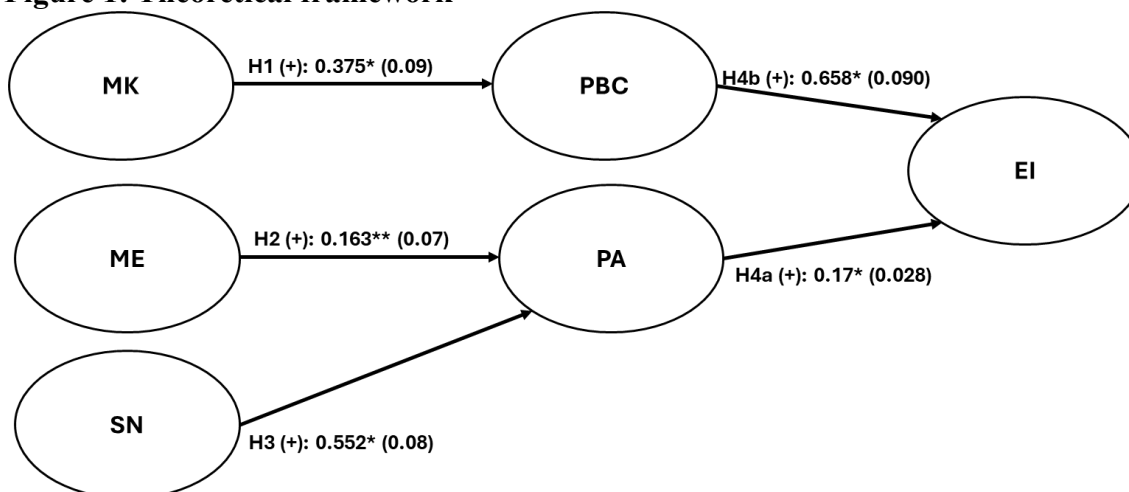
Finally, H2 also showed statistical validity with a p-value of less than 0.05 for the direct effect of "metacognitive experiences" on "personal attraction" with an explanatory percentage of 16.3% which implies a medium effect. The total explanatory percentage of entrepreneurial intention of in this model achieved a composite effect of 46.2% considered robust effect even for studies in the social sciences (Cohen, 1988; Cohen et al., 2003).

5 Discussion

Entrepreneurship is a conscious, voluntary behavior under voluntary control and entrepreneurial intentions are personal thoughts, experiences, and activities that focus on beginning a new venture (Bird, 1988). The results of this study confirm that metacognition knowledge and experiences have a positive impact on perceived behavior control and personal attitude that further impact entrepreneurial intention.

Figure 1, which shows the theoretical framework that represents the hypotheses of this research and summarizes the statistical findings.

Figure 1: Theoretical framework



Note: Results shown with standardized coefficients and standard deviations shown in parentheses. *p<0.01; **p<0.05. PCB (perceived behavior control); EI (entrepreneurial intention); PA (personal attraction); SN (subjective norms); ME (metacognitive experience) and MK (metacognitive knowledge).

Source: Prepared by the authors

This research reports that we see is support for the idea that metacognition plays an influential role as a predictor for perceived behavior control and personal attraction to entrepreneurship intention. We also report that this is in agreement with the recent conceptualization studies have been propose(Haynie et al., 2010; Haynie & Shepherd, 2009).

Metacognitive knowledge (ME) accounts for the ability of the individuals to understand your own cognitive tasks, as well as tasks, strategies and people involved in a decision-making process(Haynie & Shepherd, 2009). For entrepreneurship this faculty allows self-understand strengths, weaknesses choose of appropriate strategic approaches and adapt to changes in business environment(Haynie et al., 2010). This ability is closed linked with Bandura's (1977) concept of self-efficacy which describes how the confidence in perform an action directly influences behavior, the same believe is account for perceived behavior control (PBC) in TBP(Ajzen, 1991, 2002).

The model tested in this study confirmed that metacognitive knowledge has a positive and significant effect on PBC ($\beta = 0.375$; $p < .001$), showing that the more university students know the demands of entrepreneurial tasks and master strategies to fulfill them, the greater their perception of control over starting a business. These findings are in line with previous research highlighting cognitive adaptability as a core element of the entrepreneurial mindset (Haynie et al., 2010; Haynie & Shepherd, 2009) and reinforce that metacognitive knowledge is not only a theoretical skill, but a resource that sustains the entrepreneur's operational self-confidence.

From a practical point of view, the strengthening of metacognitive knowledge can be stimulated through active teaching methodologies, such as problem-based learning and business simulations, which expose the student to different scenarios and require reflection on strategies(Lima Filho & Bruni, 2015). By integrating this component into entrepreneurial education, universities can increase their students' PBC, creating a positive knock-on effect on entrepreneurial intent, as already observed in other educational contexts(Bagheri & Pihie, 2015).

Metacognitive experience involves the conscious use of intuitions, emotions, and past experiences as strategic resources in the decision-making process(Haynie & Shepherd, 2009). To be considered metacognitive, experience needs to be accompanied by awareness of its relationship with the formulation of strategies, allowing the entrepreneur to extract lessons learned and apply them in new contexts(Haynie et al., 2010). Studies indicate that metacognitive experience is associated with the development of a strategic mindset, which in turn increases innovation and effort(Michaelis et al., 2021), and favors the evaluation of opportunities in early stages of business(Bastian & Zucchella, 2022). Urban (2012) showed that this dimension is one of the strongest predictors of entrepreneurial intention when compared to other metacognitive dimensions.

In the present study, the metacognitive experience had a positive and significant effect on personal attraction ($\beta = 0.163$; $p = 0.017$), confirming that individuals who use intuitions and emotions strategically tend to perceive entrepreneurship as more attractive. These findings dialogue with the Theory of Planned Behavior(Ajzen, 1991), in which attitude towards behavior — here represented by personal attraction — is one of the three main predictors of intention.

From an entrepreneurship education perspective, the insertion of reflection stimulation activities on previous experiences and confidence in one's own intuitions can enhance the attraction to entrepreneurship. Therefore, case analysis, mentoring with entrepreneurs and decision-making simulations help to evoke positive emotions associated with success, reinforcing the connection proposed by Liñán (2008) between meaningful experiences and favorable attitudes. Consequently, developing the metacognitive experience can be an effective way to increase the attractiveness of entrepreneurship, especially in programs aimed at the female audience.

From the Theory of Planned Behavior (Ajzen, 1991, 2002), SN are informal understandings that govern behavior within a society and are crucial for the sense of unity and social cohesion. In the entrepreneurial context, these norms may reflect explicit encouragement from family, friends, and teachers, or the perception that "people like me" are successfully undertakings. Empirical research reinforces this connection: Bagheri & Pihie (2015) found that the perception of social support significantly increases personal attraction to entrepreneurship; Abbas et al. (2020) showed that subjective norms explain more than 50% of the variation in entrepreneurial intent in educational contexts. The results of the present study confirm this central role, with a robust effect of SN on BP ($\beta = 0.552$; $p < .001$), equivalent to 55.2% explanation of the variation in personal attraction. This indicates that social validation and reinforcement of belonging not only shape entrepreneurial intent indirectly, but directly influence how the individual perceives the attractiveness of the entrepreneurial career.

In a study developed in Colombia, Tarapuez-Chamorro, Parra-Hernández, and Gil-Giraldo (2020) point out that in certain cultures, entrepreneurial intention rises when entrepreneurial activities exhibit a greater sense of social legitimacy. Regional culture, as a determinant of SN, is intricately linked to the influences of social, economic, and political contexts that compel individuals to create new businesses. Investigating Italian university graduates, Meoli et al. (2020) assess how the immediate (i.e., the influence of relevant others) and larger context (i.e., organizational and environmental influences) affect new venture creation, concluding that educational institutions, by promoting information interchange and knowledge acquisition, assist graduates in the establishment of new business.

The finding suggests that entrepreneurial education initiatives that involve support networks — such as mentoring programs, family participation in incubator events, and dissemination of stories of successful entrepreneurs — can amplify the formation of positive attitudes. By strengthening the perception that entrepreneurship is socially valued and practiced, a feedback loop is created in which personal attraction grows and, consequently, the potential for entrepreneurial intention and action is increased (Krithika & Venkatachalam, 2014; Liñán & Chen, 2009).

Although exposure to entrepreneurship education influences intention via career attractiveness, passion, and confidence, with behavioral control effects mainly tied to financial aspects (Marques et al., 2024), in regions with abundant job opportunities often divert graduates with strong entrepreneurial intentions toward attractive, flexible employment, delaying or abandoning venture creation despite initial aspirations (Baron, 2012).

In the Theory of Planned Behavior (Ajzen, 1991), attitude toward behavior—in this study operationalized as personal attraction—is one of the three central determinants of intention. This dimension represents the subjective assessment of how desirable it is to pursue an entrepreneurial career, incorporating beliefs about expected outcomes and personal values. Liñán (2008) and Liñán & Chen (2009) confirm that PA is one of the most consistent predictors of entrepreneurial intention in different cultural contexts, functioning both as a direct variable and as a mediator of the effects of other variables, such as subjective norms and perception of control. Meta-analysis studies, such as the one by Schlaegel & Koenig (2014), also reinforce that the attractiveness of entrepreneurial activity is among the most stable factors in predicting intention, with moderate to high effect size.

The findings of the present study confirm this relationship, although with moderate magnitude ($\beta = 0.170$; $p = 0.003$), explaining 17% of the variation in entrepreneurial intention. This suggests that, although AP is a relevant element, its strength is lower than that of perceived behavioral control (PBC) in the Latin American context, possibly due to structural factors that limit the achievement of intentions even when attractiveness is high. This pattern is consistent with investigations in emerging markets, where the perception of external barriers moderates the translation of positive attitudes into action (Maciel et al., 2019; Sousa et al., 2022). In

practical terms, raising PA through immersive experiences, exposure to role models, and successful simulations can enhance its impact on intention, especially if combined with strengthening PBC to enable the transition from motivation to action (Bird, 1988; Robinson et al., 1991).

In the field of entrepreneurship research field, PBC translates into the belief that one has satisfactory resources, skills, and strategies to start and manage a business. This variable, in addition to acting as a direct predictor of intention, influences indirectly through the formation of more favorable attitudes (Liñán & Chen, 2009; C Schlaegel & M Koenig, 2014). Complementary models, such as Shapero & Sokol's Entrepreneurial Event Model (1982), reinforce this idea by associating perceived behavior control with the perception of "feasibility" - a critical factor in turning desire into action.

The results of this study point to PBC as the strongest predictor of entrepreneurial intention ($\beta = 0.658$; $p < .001$), explaining 65.8% of the variance. This finding is in line with Schlaegel & Koenig (2014) meta-analyses and Latin American studies (Maciel et al., 2019; Sousa et al., 2022), who consistently identify PBC as the most determining factor in predicting intentions. The highlight of this result may be related to the institutional and socioeconomic context of the region, where the perception of external barriers makes confidence in one's own capabilities even more decisive for the intention to emerge and be maintained. From a practical point of view, educational strategies that strengthen PBC – such as incubation programs, market simulations, and mentoring focused on solving real problems – can have a direct and substantial impact on increasing entrepreneurial intention, acting as a trigger to transform motivation into effective action.

The model tested presented a robust explanatory power for entrepreneurial intention, with $R^2 = 46.20\%$, a value considered high for studies in the social sciences, where effects above 35% are already classified as substantial (Cohen, 1998; Hair Jr et al., 2014). This indicates that almost half of the variation in the entrepreneurial intention of university students can be attributed together to the variables included – perception of behavioral control (PBC), personal attraction (PA), subjective norms (SN), metacognitive knowledge (MK) and metacognitive experience (ME).

The high contribution of the PBC ($\beta = 0.658$) suggests that the perception of viability is the most determining factor to explain IE, reinforcing previous findings by Liñán & Chen (2009) and Schlaegel & Koenig (2014). However, the model also highlights the relevance of attitudinal and social influences – BP ($\beta = 0.170$) and SN ($\beta = 0.552$) – and the cognitive-metacognitive role, with direct effects of KM on PBC and BD on BP. The balance between individual, social and cognitive factors reinforces the theoretical adequacy of the proposed framework, aligned with the Theory of Planned Behavior (Ajzen, 1991, 2002) and the metacognition model of Haynie et al. (2009).

In summary, the model demonstrates strong adherence to theoretical assumptions, but beyond that also offers empirical evidence that integrating metacognition and TPB can significantly expand its explanatory power, especially in emerging market contexts. This integration of conceptual frameworks contributes to a more comprehensive view of the formation of entrepreneurial intention, reconciling cognitive, social and dispositional dimensions in a unified analytical framework.

6 Final remarks

The present study aimed to analyze the formation of entrepreneurial intention (EI) in Brazilian university students, integrating central constructs of the Theory of Planned Behavior (TPB) (Ajzen, 1991, 2002) with metacognitive dimensions proposed by Haynie and

Shepherd(2009). The theoretical model assessed sought to understand how metacognitive knowledge, metacognitive experience and subjective norms are related to personal attraction and the perception of behavioral control (PBC), directly influencing entrepreneurial intention. The approach adopted allowed not only to confirm relationships predicted in the literature, but also to broaden the understanding of the role of cognitive and social resources in the entrepreneurial decision-making process.

The results revealed that TPB was the strongest predictor of EI ($\beta = 0.658$; $p < .001$), confirming the central role of the perception of viability in the decision to undertake. Personal attraction had a positive and significant effect ($\beta = 0.170$; $p = 0.003$), but with a smaller magnitude, suggesting that, in the context investigated, favorable attitudes need to be accompanied by a robust sense of capacity to be converted into intention. In addition, subjective norms exerted a strong influence on personal attraction ($\beta = 0.552$; $p < .001$), reinforcing the relevance of perceived social support. In turn, metacognitive knowledge contributed significantly to increase the PBC ($\beta = 0.375$; $p < .001$), while the metacognitive experience positively impacted personal attraction ($\beta = 0.163$; $p = 0.017$).

The findings are in line with previous studies that point to TPB as the dominant variable in predicting EI (Liñán & Chen, 2009; C Schlaegel & M Koenig, 2014), as well as the evidence that subjective norms are an important antecedent of entrepreneurial attitudes (Abbas et al., 2020; Bagheri & Pihie, 2015). The confirmation of the effects of metacognitive dimensions is in line with studies such as Urban (2012) and Michaelis et al. (2021), which highlight the relevance of self-reflexive mechanisms in evaluating opportunities and building entrepreneurial trust. The integration of these results reinforces the relevance of hybrid models that combine elements of TPB with cognition and metacognition constructs.

Theoretically, this study contributes by broadening the scope of TPB to include metacognitive dimensions as indirect antecedents of entrepreneurial intention. The distinction between knowledge and metacognitive experience proved useful for understanding different paths of influence: knowledge strengthens the perception of feasibility, while experience influences perceived attractiveness. Such differentiation may help explain variations in the results of previous studies and opens space for further investigations that explore the interaction between cognitive and contextual aspects in the formation of EI.

Although the model had robust explanatory power ($R^2 = 46.20\%$), some limitations should be acknowledged. The sample was non-probabilistic and restricted to Brazilian university students, which limits the generalization to other audiences and cultural contexts. The cross-sectional nature of the study also precludes the inference of causal relationships. Future research could adopt longitudinal designs, include diverse samples in terms of professional experience, and test the model in different Latin American countries to verify its external validity.

From a practical perspective, the results point to a clear path: entrepreneurial education should not only reinforce the principles of the Theory of Planned Behavior (TPB), but also nurture students' personal attraction to entrepreneurship. That means going beyond technical instruction – offering experiences that build problem-solving skills and confidence (boosting perceived behavioral control), while also creating environments that inspire, engage emotionally, and spark genuine interest (enhancing personal attraction). Programs like mentoring, innovation challenges, university incubators, and business simulations play a key role here. They help students apply metacognitive strategies in real contexts and build strong support networks. When technical knowledge is combined with reflective and emotional engagement, educational institutions and policymakers can foster ecosystems where entrepreneurial intentions are more likely to evolve into real, viable ventures.

7 References

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