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Developing orientation to achieve entrepreneurial intention: A pretest-post-test analysis of entrepreneurship education programs

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ABSTRACT

This paper develops and tests a model considering the effects of entrepreneurship education programs on the individual entrepreneurial orientation (IEO) and the role of IEO as an antecedent of the attitudes and entrepreneurial intention (EI) through the dimensions of Theory of planned behavior (TBP). This study uses a pretest-post-test analysis with data from two emerging countries in Latin America by considering 1723 Colombian and Ecuadorian undergraduate students. Sign-Test and Wilcoxon signed-rank test confirmed the impact of entrepreneurship education programs on IEO. Moreover, structural equation modeling was used to validate the theoretical model and test hypotheses between IEO, TBP and EI. The findings offer important theoretical and practical implications for the field of entrepreneurship education and entrepreneurial behavior.

1. Introduction

A starting point to justify entrepreneurship education could be to perceive it as a means to achieve, among other skills, interest, joy, commitment and creativity among students (Johannisson, 2010; Lackéus, 2015). The impact of entrepreneurship education on the development of entrepreneurial competencies not only regarding venture creation but also to improve opportunities recognition and abilities to cope with a globalized world with changing economies has been a significant subject of academic studies over the past two decades (Ahmed et al., 2020; Fayolle et al., 2006; Liñán, Rodríguez-Cohard, & Rueda-Cantuche, 2011; Lopez et al., 2021; Nabi et al., 2018; Sherkat & Chenari, 2020; Souitaris et al., 2007; Tung et al., 2020; Zhang et al., 2014). This has allowed the development of a vast body of knowledge on this issue; however, specific results are not consistent, some lack broad samples, different methodologies or variables, and constructs that complement existing relationships and the effectiveness of entrepreneurship education (Bae et al., 2014; Matlay et al., 2014; Nabi et al., 2017; Rideout & Gray, 2013).

In turn, the Theory of planned behavior (TPB) has been established as the main framework for explaining entrepreneurial intention (EI), and its three dimensions (attitude towards behavior - ATB, subjective norms – SN, and perceived behavioral control - PBC) are crucial to understanding the antecedents of entrepreneurial behavior (Kautonen et al., 2013). However, the drivers of ATB, SN and PBC are still underexplored and, therefore, the discussion on motivators and obstacles to EI is still an issue that is not exhausted and remains on the research agenda in the discipline of entrepreneurship. According to the above, the entrepreneurial orientation at the individual level emerges as a construct that captures the individual's cognitive aspects related to motivation towards behavior (Bolton & Lane, 2012; Martins & Perez, 2020).

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This study addresses the impact of entrepreneurship education programs on individual entrepreneurial orientation (IEO) development and how the IEO construct can impact EI through the TPB dimensions. It is thereby filled a significant gap; namely, this study contains three important novelties regarding previous research. First, the main contribution is providing evidence about the impact of entrepreneurship education programs on developing key competencies for entrepreneurial activity in two developing economies in Latin America. In other words, if on the one hand there is empirical evidence of the impact of entrepreneurship education on the entrepreneurial intent (Fayolle & Gailly, 2015; Nabi et al., 2018; Souitaris et al., 2007), on the other hand, at date little or almost nothing is known about the impact of entrepreneurship education programs on IEO. Second, findings may shed light on the discussion about the role of the IEO in the development of the intention of launching a business. Third, the study offers new evidence that oxygenates the EI phenomenon explanation of individual behavior through the TPB framework.

The remainder of this paper is structured as follows: Next section presents a theoretical framework and previous studies supporting the hypotheses. Section 3 describes the research design and data. Section 4 provides the results, and Section 5 discusses the findings and offers theoretical and practical implications.

2. Theoretical framework, previous studies and hypotheses

2.1. Entrepreneurship education and individual entrepreneurial orientation development

The role of entrepreneurship education programs is increasingly emphasized in higher education from the belief that individuals' entrepreneurial mindset and skills can be developed (Fayolle, 2013; Fayolle et al., 2006). Thus, entrepreneurship education is currently a fruitful field of entrepreneurship research, and the results underscore the crucial role of entrepreneurial courses in developing certain entrepreneurial competencies and aptitudes (Karlsson & Moberg, 2013; Matlay, 2008; Wilson et al., 2007). Moreover, previous studies pointed out that an orientation towards entrepreneurship can be motivated inside the classroom by considering empirical evidence in both contexts: secondary school students (Frank et al., 2005; Rodrigues et al., 2012; Sánchez, 2013), and undergraduate students (Levenburg & Schwarz, 2008; Martins et al., 2018; Sánchez, 2011). Thus, incorporating of entrepreneurship in planning curricula has sought to stimulate cognitive and non-cognitive factors such as managerial knowledge, communication and problem-solving ability, creativity, leadership, self-efficiency, and the willingness to take risks (Frank, 2007).

Therefore, the impact of entrepreneurship education on IEO dimensions can be significant and increase meaningfully the innovativeness, proactiveness and risk-taking (Robinson & Stubberud, 2014).

Given the aforementioned, the following hypotheses are addressed:

H1. Entrepreneurship education programs increase students' IEO.

H1a. At the end of an entrepreneurship education program, the greater students' innovativeness.

H1b. At the end of an entrepreneurship education program, the greater students' proactiveness.

H1c. At the end of an entrepreneurship education program, the greater students' risk-taking.

2.2. Individual entrepreneurial orientation and the antecedents of entrepreneurial intention

Entrepreneurial orientation as a firm-level construct receives substantial conception and empirical attention, and represents one of the areas of entrepreneurship research where a cumulative body of knowledge is developing for a holistic and synthetic view of entrepreneurial orientation at firm-level, see Anderson et al. (2015); Rauch et al. (2009). On one side, entrepreneurial orientation was widely addressed in the organizational context, and some scholars pointed out that the individual is not the object of study for which the construct was initially proposed (Covin & Miller, 2014). On the other side, an organization can be defined as a result of individuals' behavior and is ultimately run by people (Bolton & Lane, 2012; Ferreira et al., 2015; S.; Robinson & Stubberud, 2014). Therefore, entrepreneurial orientation can refer to both firms and individuals' level (Ferreira et al., 2017; Kollmann et al., 2007; Martins & Perez, 2020; Santos et al., 2020). Moreover, the construct was originally conceived considering psychological aspects that capture beliefs and behaviors that lead to an individual presenting a more entrepreneurial or conservative stance in terms of business.

Students' proclivity into entrepreneurship tends to present values associated with innovativeness, proactiveness and risk-taking, simultaneously (Goktan & Gupta, 2015; Martins & Perez, 2020). In other words, cognitive aspects of the individual influence motivation towards behavior, particularly personal attributes such as willingness to innovate and propensity to risk exposure, which make individuals more prone to entrepreneurial activities (Gupta et al., 2016; Krauss et al., 2005; Marques et al., 2013; Martins & Perez, 2020), because individuals with these personality traits identify opportunities and act on them (Sánchez, 2013).

One of the first studies considering entrepreneurial orientation at the individual level observes whether the "entrepreneurial attitude orientation", measured as the individual disposition toward entrepreneurship, is a predictor of entrepreneurial activity (Robinson et al., 1991). Nowadays, more scholars consider this construct by taking into account the three dimensions: innovativeness, proactiveness, and risk-taking. Thus, reinforcing the classical subscales and positioning the IEO as a theoretical and empirical well-tested individual-level construct (Goktan & Gupta, 2015; Gupta et al., 2016; Jelenc et al., 2016; Kollmann et al., 2017; Martins et al., 2018; Martins & Perez, 2020). Additionally, the relationship between IEO and EI has been analyzed in previous studies by considering the psychological and cognitive factors that impact individual's desire to become self-employed since it is recognized that creative and innovative individuals are always alert to entrepreneurial opportunities and are more prone to entrepreneurial intent (Gupta et al., 2016; Kropp et al., 2008; Marques et al., 2013). As a result, the following hypotheses can be addressed:

H2. IEO is positively associated with the antecedents of entrepreneurial intention (TPB dimensions).

H2a. IEO is positively associated with attitude towards behavior.

H2b. IEO is positively associated with subjective norms.

H2c. IEO is positively associated with perceived behavioral control.

2.3. Theory of planned behavior and entrepreneurial intention

In the TPB, the intention is the combination of three antecedents: a favorable or unfavorable attitude towards behavior, perceived social support to perform or not perform the behavior (subjective norms), and the perceived behavioral control (Ajzen, 1991). In summary, the greater the intention to perform a behavior, the greater the probability of executing it, making it possible to predict the behavior.

Applied to entrepreneurship, the more favorable attitudes concerning an entrepreneurial behavior, the more supportive the closer environment in terms of entrepreneurship and the more capable individuals fell to performing as an entrepreneur; would make more feasible individual's intention of engaging in an entrepreneurial career (Kautonen et al., 2013; Liñán, Urbano, & Guerrero, 2011; Tung et al., 2020).

The TPB has been a popular frame to understand entrepreneurship, and its usage in this branch of the literature has been widely accepted for the last 20 years (Lortie & Castogiovanni, 2015) given its capacity to explain EI, as in has been found in systematic literature reviews (Liñán & Fayolle, 2015). The success of the TPB in the study of EI is given by its capacity to explain a considerable proportion of the variance of this phenomenon and the statistical significance of its constructs (Gird & Bagraim, 2008; Kautonen et al., 2013).

The TPB assumes different forms of interaction in the determination of EI. As a mediating construct, it has allowed the identification of the role of environmental factors (Liñán, Urbano, & Guerrero, 2011), need satisfaction (Al-Jubari, 2019), entrepreneurial knowledge (Karadağ & Şahin, 2021; Miralles et al., 2016; Roy et al., 2017), career options (Roy et al., 2017), among others. While as an independent construct, it has received the moderating effect of entrepreneurial education (Anwar et al., 2020), creativity (Entrialgo & Iglesias, 2020; Shi et al., 2020), intended timing of future entrepreneurial activities (Ramos-Rodríguez et al., 2019), etc. Consequently, the TPB is a mature approximation for analyzing EI and deriving public policy suggestions (Pihie, 2009).

In order to verify the results of previous studies and add new evidence from two developing countries, the authors present the following hypotheses:

H3. The higher the antecedents (TPB dimensions), the higher is students' entrepreneurial intention.

H3a. The higher the attitude towards behavior, the higher is students' entrepreneurial intention.

H3b. The higher the subjective norms, the higher is students' entrepreneurial intention.

H3c. The higher the perceived behavioral control, the higher is students' entrepreneurial intention.

2.4. The mediating roles of Theory of planned behavior dimensions in the relationship between individual entrepreneurial orientation and entrepreneurial intention

As presented in the previous section, the TPB has been a robust approach for analyzing EI. However, complementary frameworks such as IEO bring new insights to understand those personal attributes that increase the desire to start a business (Koe, 2016; Martins & Perez, 2020). The three dimensions of the IEO: innovativeness, proactiveness, and risk-taking, unveil traits that impact the performance of the entrepreneurs and influence their perceptions towards business creation. Therefore, IEO contains valuable information that, in conjunction with personal traits and social norms, untie the principles of EI (Gurel et al., 2010; Sánchez, 2013).

In particular, the IEO's constructs reflect abilities to create and manage a company, which influences the self-efficacy of the entrepreneur (Bandura, 1977; Tsai et al., 2016). Considering that the self-efficacy concept is the principle of TPB's PBC, it is expected that such dimension mediates the relationship between IEO and eEI. Moreover, the dimensions of the TPB are interdependent (Ahmed et al., 2020; Ajzen, 1991; Liñán, Urbano, & Guerrero, 2011; Lopez et al., 2021). The interdependency in this context implies, on the one hand, that IEO impacts their perception of the desirability of entrepreneurship consequences, so it is expected that ATB mediates the relationship between IEO and EI. On the other hand, that IEO affects the personal notion of social support that entrepreneurs have to constitute a business, so it is expected that SN mediate the relationship between IEO and EI.

According to the previously established H2 and H3, the IEO determines the three antecedents that define the intention to become an entrepreneur. In addition, as it can be theoretically seen, the IEO might impact EI through the mediation of the TPB's dimensions. Therefore, an exogenous variable (IEO) effect on the endogenous variable (EI) is expected through a complete mediation of the antecedents of intention. In consequence, the following hypotheses are proposed:

H4. TPB dimensions mediates the relationship between IEO and entrepreneurial intention.

H4a. Attitude towards behavior mediates the relationship between IEO and entrepreneurial intention.

H4b. Subjective norms mediates the relationship between IEO and entrepreneurial intention.

H4c. Perceived behavioral control mediates the relationship between IEO and entrepreneurial intention.

Fig. 1 presents the theoretical model and proposed relationships.

3. Methodology

3.1. Data and sample

The study was conducted in two very long-established Latin American universities located in the cities of Medellín, Colombia and Loja, Ecuador. Both universities with excellent reputations and a recognized vocation for entrepreneurial education (universities with a clear entrepreneurial push strategy); in addition, two programs that were similar and represented good practice were selected.

Latin America, in general, is an interesting region for entrepreneurship studies due to institutional aspects such as the positive assessment of entrepreneurial activity and the greater propensity of its inhabitants to create new companies, compared to other regions (Aguinis et al., 2020). In turn, Colombia and Ecuador share key features in terms of entrepreneurship that allow both countries to be considered for a comparative study. First, Colombia and Ecuador are two middle-income countries in the Latin America and Caribbean region and share very similar perceptions in terms of entrepreneurial activity, according to their adult population (Bosma et al., 2020). Second, both countries present an EI of their university students higher than the international average: Ecuador reaching 5.7 and in Colombia 5.6, while the international average is 3.9 (all values on a scale up to 7); third, students presented the same opinion in terms of the most appropriate moment to start a business. There is a low EI immediately after graduation. However, when asked what they would like to be doing five years after graduation, most project themselves as entrepreneurs, and a smaller percentage view themselves as employees (Jácome & Jácome, 2020; Martins et al., 2019).

Data was collected over three semesters (2018 semester 2 and 2019 semesters 1 and 2). This non-probabilistic or non-random sampling technique that is often used in research focused on educational contexts due to accessibility, availability and geographic proximity (Henley et al., 2017; Martins & Perez, 2020), although it does not allow generalization, provides particular findings that allow forging links in the area of knowledge and futures guidelines research (Bryman et al., 2018). The information is part of a survey conducted every six months since 2015 by the Colombian university and since 2017 by the Ecuadorian university, with undergraduate students enrolled in 'entrepreneurship training'. This training, which is transversal to all major degrees offered by the universities and is part of the institutional core, seeks to promote in students a process of pedagogical formation on their attitudes and skills guided to entrepreneurship to encourage entrepreneurial behavior in them.

The survey has two phases (t and (t+1)). During the first week of classes (t), students answer an online questionnaire to assess students' prior knowledge about entrepreneurship, entrepreneurial experiences, orientation and intention towards entrepreneurship, among others. The second phase is carried out at the end of the semester (t+1), during the last week of classes and aims to identify how the answers about knowledge and perceptions have changed. The questionnaire is presented using a seven-point Likert scale (1 being the minimum and 7 being the maximum) and dichotomous questions. All the information necessary to IEO, TPB and EI constructs is considered and questions that reflect demographic variables such as age and gender.

The sample used in this research is composed of 1723 undergraduate students from different majors. Thus, 66.69% of the respondents are from the Colombian university, while 33.31% are from the Ecuadorian university. Furthermore, 52.87% of the sample is made up of the female gender, and the remaining percentage is by the male gender (47.13%); in turn, 81.60% of the sample is between

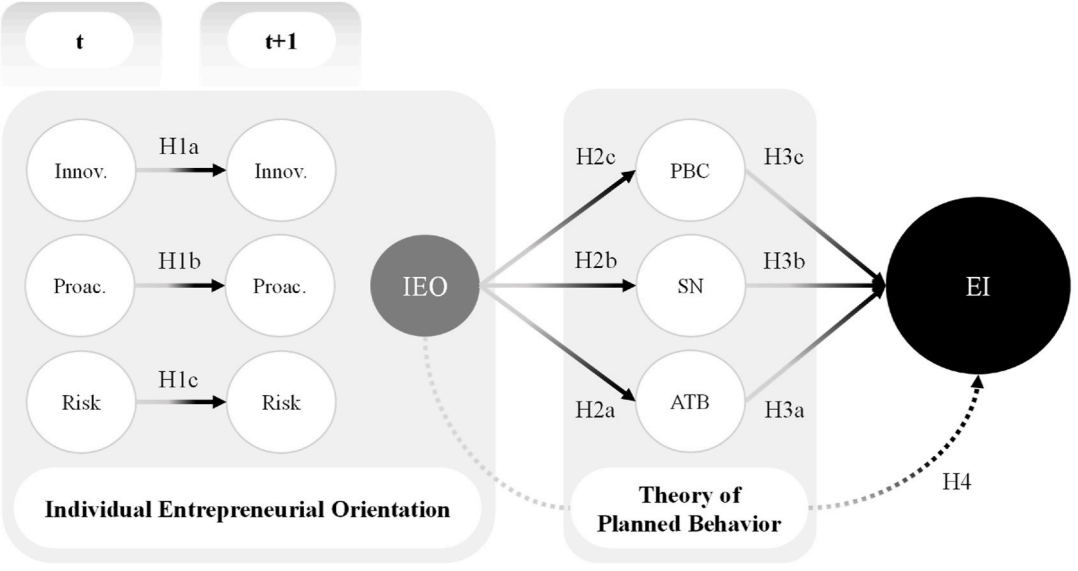

Fig. 1. Proposed model.

Table 1
Individual entrepreneurial orientation EFA and CFA.

Statistic		1. Innovativeness				2. Proactiveness			3. Risk Taking		
		I1	I2	I3	I4	P1	P2	P3	R1	R2	R3
EFA	**Factor Loading Communality Correlation**	0.547 0.528 ρ(1,2) = 0.622***, ρ(1,3) = 0.634***	0.689 0.627	0.751 0.681	0.807 0.782	0.806 0.773 ρ(2,1) = 0.622***, ρ(2,3) = 0.676***	0.646 0.647	0.629 0.670	0.769 0.765 ρ(1,3) = 0.634***, ρ(3,2) = 0.676***	0.534 0.512	0.689 0.710
CFA	**CR (3-factor)**		0.795				0.738			0.706	
	α (3-factor)		0.875				0.862			0.841	
	AVE - MSV (3-factor)		0.095				0.031			−0.007	
	SRW (3-factor)	0.720***	0.800***	0.817***	0.866***	0.806***	0.819***	0.840***	0.830***	0.714***	0.862***
	Covariance (3-factor)	C(1,2) = 0.956***, C(1,3) = 0.985***				C(2,1) = 0.956***, C(2,3) = 1.022***			C(1,3) = 0.985***, C(3,2) = 1.022***		
	CFA Model	**RMR**	**RMSEA**	**CFI**	**TLI**						
	1-factor	0.123	0.165	0.849	0.805						
	3-factor	0.062	0.074	0.972	0.960						

EFA (exploratory factorial analysis), CFA (confirmatory factorial analysis), ρ (correlation coefficient), CR (composite reliability) and α (Cronbach's alpha), AVE (average variance extracted), MSV (maximum shared variance), SRW (standardized regression weights), C (covariance SEM 3 factor model), RMR (root mean square), RMSEA (root mean square error of approximation), CFI (comparative fit index), TLI (Tucker-Lewis index). *** Indicates significance at 0.01. Data in (t+1).

18 and 24 years old.

3.2. Measures

3.2.1. Entrepreneurial intention (EI)

The intention, as a predictor of the behavior to start a new business or firm, has occupied an important and frequent place in the entrepreneurial literature (Fayolle et al., 2014; Thompson, 2009). Particularly, EI is recognized as a cognitive state that captures the individual decision for creating and establishing a new business (Bullough et al., 2014). This intention is defined as an immediate factor that predicts the real behavior of the individual, and therefore it can be measured from desire or preference, self-prediction and intentional behavior (Armitage & Conner, 2001).

A large part of the literature adopts a construct based on two or three of these dimensions to measure EI (Rosique-Blasco et al., 2018). Where, intentional behavior being one of the strongest predictors of behavior, exhibits better results in terms of intentionality (Armitage & Conner, 2001; Liñán & Chen, 2009), making it one of the most recurrent measures for EI. Thus, it was used a pure-intention measure of reflective character proposed by Liñán and Chen (2009), composed of 6 items and complemented with one item related to the availability and financial feasibility adapted from Thompson (2009), which are answered at a 7 point Likert type scale where 1 indicates strongly disagree and 7 strongly agree.

3.2.2. Individual entrepreneurial orientation (IEO)

Entrepreneurial orientation, as an individual approach, has been conceptualized from three dimensions, namely risk-taking, innovativeness and proactiveness. Such dimensions allow measuring the characteristics, traits or personal attitudes that affect the propensity of individuals to engage in and being successful at entrepreneurial activities (Bolton & Lane, 2012). The realization of these three dimensions in the IEO construct has shown good reliability and validity, such as the confirmed by Bolton and Lane (2012). Considering the results of the authors, it was used a measure in 7-point Likert scale for the three items of risk-taking and proactiveness and the four items of innovativeness for identifying the preferences of individuals with respect to the three dimensions.

3.2.3. Theory of planned behavior dimensions

TPB, as a theoretical development from which it is possible to understand intentionality in individual behavior is structured on three determinants that are conceived as motivational antecedents, namely, attitudes towards behavior (ATB), subjective norms (SN) and perceived behavioral control (PBC). These antecedents have been widely validated to explain the intentionality of entrepreneurial behavior (Liñán, Rodríguez-Cohard, & Rueda-Cantuche, 2011; Liñán & Fayolle, 2015) and usually adopt a reflexive measurement on a 7-point Likert scale. Thus, ATB as the personal assessment regarding being an entrepreneur consists of 5 items, SN that measures the perceived social pressure to carry out (or not) the entrepreneurial behavior is made up of 3 items, and PBC as the perceived difficulty or ease in compliance of this behavior consists of 6 items. All of the above measures were adopted from Liñán and Chen (2009).

3.2.4. Factorial analysis and common method variance

In accordance with the IEO specification, exploratory and conformational factor analysis is carried out to guarantee its adequate construction. Thus, a Kaiser Meyer Olkin (KMO) statistic of 0.923 denotes the adequacy of the sample size concerning the exploratory factor analysis (EFA). This analysis, which was conducted using the maximum likelihood estimator and the varimax rotation, suggests 3 factors with eigenvalues above 1 that explain 66.9% of the variance of the original items. In this regard, all items were conserved according to the criterion of communalities greater than 0.4 (Costello & Osborne, 2005) as observed in Table 1. Such items adequately load their theoretical fact since they exhibit factorial loadings above 0.5 and cross loadings below 0.4. Additionally, the three factors are positively and significantly correlated. Therefore, these factors emerge as dimensions of a more general factor (IEO).

In turn, the confirmatory factor analysis (CFA) that is adopted to confirm the psychometric properties of the measures is done by comparing a 1-factor and a 3-factor model for IEO through structural equation modeling (SEM) analysis. Thus, the 3-factor model fits better than the 1-factor model as shown by the goodness-of-fit indicators. In the case of root mean square error of approximation (RMSEA) and standardized root mean square residual (SRMR) that denotes the adjustment regarding the population, both are below 0.08 in the 3-factor model, as is not the case with the 1-factor model. In addition, the comparative fit index (CFI) and Tucker-Lewis index (TLI), which compare the proposed model with respect to the null model, yield satisfactory values for the 3-factor model (>0.95) in contrast to the 1-factor model. The 3-factor model is then chosen, where the discriminate validity is confirmed for most of

Table 2
Validity and reliability of EI and theory of planned behavior dimensions.

Variable	Factor			AVE	MSV	CR	α
	1	2	3				
EI	[0.684, 0.944]			0.761	0.650	0.957	0.953
ATB	[0.616, 0.861]			0.615	0.650	0.888	0.932
SN		[0.699, 0.875]		0.660	0.243	0.852	0.877
PBC			[0.689, 0.913]	0.601	0.469	0.900	0.928

[minimum factor loading, maximum factor loading], AVE (average variance extracted), MSV (maximum shared variance), CR (composite reliability) and α (Cronbach's alpha). Data in (t+1).

the factors since the difference between average variance extracted (AVE) statistic, and the maximum shared variance (MSV) is positive (Fornell & Larcker, 1981), while the reliability is guaranteed by a Cronbach's alpha and composite reliability (CR) close to 1 for each factor (Hair et al., 2010; Helms et al., 2006).

Regarding the factors associated with TPB and EI, factor loadings above 0.5 for all constructs suggest adequate validity, as shown in Table 2. As expected in the case of the TPB, the factor analysis results in three factors that explain 71.8% of the total variance and a sample adequacy statistic close to 1 (KMO = 0.923). In line with the above, the AVE statistic turns out to be above the MSV for most factors, which suggests an absence of correlation between the variables that are expected not to be associated, that is, discriminant validity. Regarding reliability, Cronbach's alpha greater than 0.7 suggests adequate internal consistency for each of the factors, which is verified with CR above 0.8.

Given the characteristics of the information collection -through the survey technique-, common method variance (CMV) can occur, which results in systematic measurement biases and erroneous internal consistency (Podsakoff et al., 2003; Podsakoff & Organ, 1986). Thus, the EFA results show more than 5 factors that explain around 73.7% of the total variance. Therefore, according to the Harman factor test it is impossible to concentrate most of the covariance between the measures in a single factor, suggesting the absence of CMV (Meade et al., 2007; Podsakoff et al., 2003). This result is supported in the multitrait–multimethod (MTMM) approach since the common variance amounting to 49.1% is below the 50% threshold.

3.3. Two-time and structural analysis

3.3.1. Using two-time analysis

For testing the effect that the entrepreneurship education programs generated on the IEO of the students, it was used the Sign-Test, and the Wilcoxon signed-rank test on a sample made up of the observations of the two countries. Both non-parametric tests allow to identify consistent differences at the level of medians for the difference of two populations when the observations are paired; thus, the Wilcoxon signed-rank test considers the magnitude of the observation in contrast to the Sign-Test (Gibbons & Chakraborti, 2011). To do this were constructed the factors from the average of the items of each dimension of the IEO in (t) and (t+1), and then statistically verified if there were significant changes in the median from one point of time to the other one. Given the large size of the sample, the application of the techniques described is carried out using a sided test. To verify the changes visually at the two points in time, the boxplot is used. Such a technique allows obtaining an exploratory graphical representation of the location, dispersion, asymmetry and width of the tails of the data, using for this the division of the quartiles (Benjamini, 1988).

3.3.2. Structural equation modeling (SEM) analysis

In order to determine the effect that the IEO has on the dimensions of the TPB and the relationship of the latter with the EI, multigroup SEM with sample in (t+1) is used. SEM is a technique that allows specifying, estimating, and evaluating linear relationship models between a set of observed variables in terms of unobserved variables (Shah & Goldstein, 2006). In this sense, SEM that carries out the estimation of a series of independent but simultaneous multiple regression equations (Hair et al., 2010) has broad advantages over traditional multivariate techniques in terms of the explicit evaluation of measurement error, the estimation of unobserved variables from variables observed, as well as the specification and tests associated with the model (Cheng, 2001; Nunkoo & Ramkissoon, 2012).

The specification of the model corresponds to a full mediation, and therefore an indirect effect prevails between the exogenous latent variable (IEO) and the endogenous latent variable (EI), while the direct relationship between both variables is non-existent (Zhao et al., 2010). According to this specification and the reflexive nature of the unobservable measures, the sample size and psychometric and theoretical approach of the proposed model, the covariance-based structural equation modeling is adopted (Davcik, 2014) where the maximum likelihood estimation is carried out in the software AMOS. In turn, through the extraction of samples with independent replacement of the data set (bootstrapping approach), the relationships of full mediation are examined using the two-tailed significance level.

Table 3
Sign-Test and Wilcoxon signed-rank test.

Variable	Sign-Test	WSRT
H1a: Innovativeness	9.501*** (580)	10.183*** (411750)
H1b: Proactiveness	4.881*** (618)	4.714*** (432543)
H1c: Risk-taking	5.202*** (618)	5.758*** (424600)

WSRT (Wilcoxon signed-rank test). The number in brackets () indicates the value of the sign. z-statistic for both tests is reported in absolute value. *** Indicates significance at 0.01.

4. Results

According to the results, entrepreneurship education can influence entrepreneurial orientation at the individual level, as demonstrated in Table 3. Particularly, the findings of z-statistic in Sign-Test and Wilcoxon signed-rank test indicate how entrepreneurship courses have a significant impact on the innovativeness, proactiveness and risk-taking of all the individuals in the sample since the difference in the perception of the individuals in the sample for two points of time is statistically different from zero. In turn, such change turns out to be positive, as evidenced in Fig. 2. Thus, the difference in average median values between (t) and (t+1) is noticeably perceived in proactiveness and risk-taking and is approximately half a unit, while in innovativeness, such difference is close to a third of the unit. It is noteworthy that the interquartile range in which most of the data is concentrated presents an increase for both innovativeness and risk-taking while the variance remains constant. Then Hypothesis 1 is confirmed by the results.

Following the specification of the proposed SEM, the antecedents of EI represented in the three dimensions of the TPB act as full mediating variables of the relationship between IEO and EI, which implies that the direct relationship between both variables is not significant. In this regard, the results of the estimation verify the absence of this relationship for both the Colombian ($\beta = 0.007$, $p = 0.877$) and Ecuadorian ($\beta = 0.005$, $p = 0.929$) cases, and therefore a complete mediation model is guaranteed.

In this sense, the goodness of fit statistics suggests an adequate specification of the model. Thus, in terms of the global adjustment, RMSEA corresponds to 0,054, aligned with an SRMR less than 0,08 (0,064) and a CFI close to 1 (0,916). The results of the estimated relationships between IEO construct and the dimensions of the TPB and the effects of these on EI are shown in Tables 4 and 5.

According to the results, the IEO has a direct effect on ATB, SN and PBC, which is demonstrated by the estimated coefficients for both Colombia and Ecuador that turn out to be positive and significant at a confidence level above 99%. In disaggregated terms, the effect of IEO on SN is greater in the Ecuadorian context, while the effect on the other two dimensions for both countries remains at similar levels. In this sense, Hypothesis 2 is fully accepted.

Regarding the dimensions of the TPB and its effect on EI, the results partially support Hypothesis 3. Thus, ATB has a direct and significant relationship on EI, being slightly higher for the Colombian context ($\beta = 0{,}863$, $p < 0{,}01$) in contrast to the Ecuadorian context ($\beta = 0{,}6773$, $p < 0{,}01$), therefore Hypothesis 3a is accepted. For its part, the relationship between SN and EI presents varied results for the two groups. In the Colombian case, such relationship, although significant and marginal, is inverse ($\beta = -0{,}099$, $p < 0{,}01$), while in the Ecuadorian case, it is not significant ($\beta = 0{,}008$, $p = 0{,}738$), then Hypothesis 3b is rejected. Finally, PBC has a positive and significant effect on EI for both countries at similar levels, and therefore, Hypothesis 3c is accepted.

Regarding the Colombian sample, the estimation of the indirect effects shows how ATB, SN and PBC act as full mediating variables

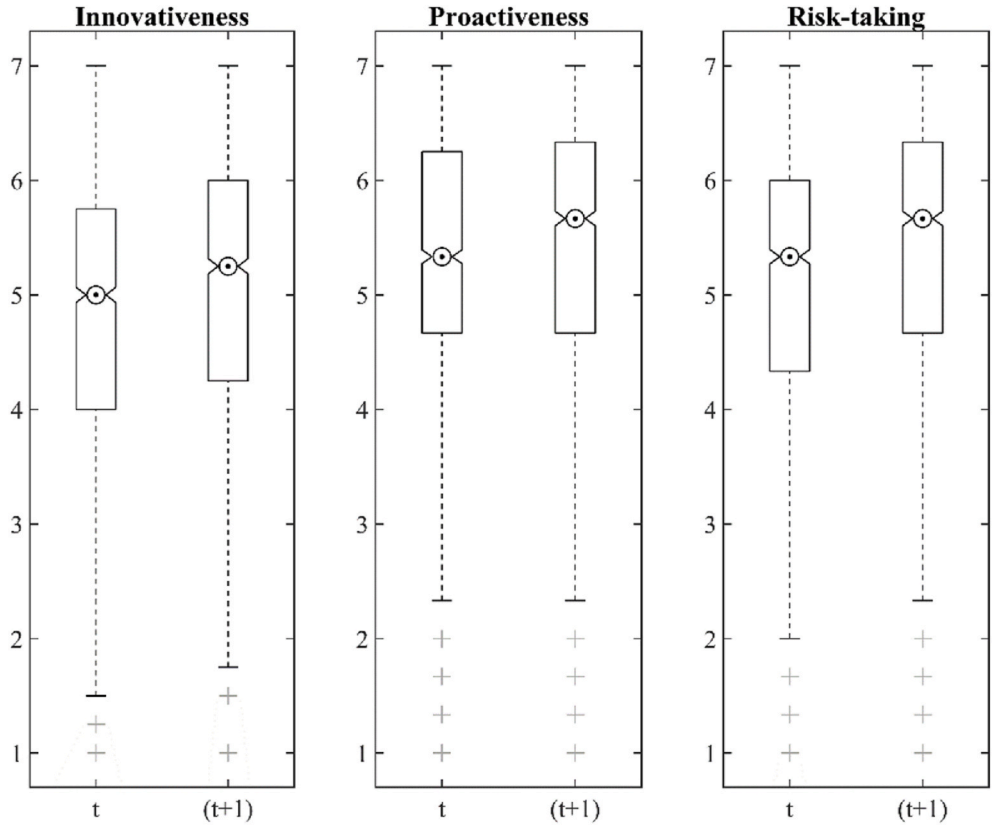

Fig. 2. Boxplot on IEO dimensions at (t) and (t+1).

Table 4
Estimation of direct relations.

Relation	Colombia	Ecuador
H2a: Effect of IEO on ATB	0.859*** (0.041)	0.755*** (0.044)
H2b: Effect of IEO on SN	0.459*** (0.033)	0.701*** (0,054)
H2c: Effect of IEO on PBC	0.920*** (0.046)	0.934*** (0.054)
H3a: Effect of ATB on EI	0.863*** (0.030)	0.677*** (0.041)
H3b: Effect of SN on EI	−0.099*** (0.025)	0.008 (0.024)
H3c: Effect of PBC on EI	0.272*** (0.019)	0.324*** (0.028)

The numbers in brackets () are the estimation standard error. *** Indicates significance at 0.01.

Table 5
Estimation of indirect relations.

Relation	Colombia	Ecuador
H4a: Effect of IEO on EI mediated by ATB	0.741***	0.511***
	(0.047)	(0.068)
H4b: Effect of IEO on EI mediated by SN	−0.045***	0.006
	(0.015)	(0.022)
H4c: Effect of IEO on EI mediated by PBC	0.250***	0.303***
	(0.032)	(0.064)

The numbers in brackets () are the estimation standard error. *** Indicates significance at 0.01.

in the relationship between IEO and EI as observed in Table 5. Specifically, ATB and PBC positively intervene in this relationship, while SN intervenes negatively. This situation results in a total effect of the IEO on the EI of 0.945. In turn, in the Ecuadorian sample, the effect of the IEO on the EI is achieved only through ATB and PBC, which translates into a total effect of 0.819. Therefore, as a cognitive variable that precedes the motivational antecedents, IEO leads to a manifest intention to carry out an entrepreneurial behavior thanks to the mediating intervention of ATB and PBC, and therefore hypotheses 4a and 4c are accepted.

Finally, the explained variance of the model through R^2 suggests an adequate level of determination. Thus, the model explains 50.2%, 22.6% and 43.9% of the variance associated with the latent variables ATB, SN and PBC -respectively- for the Colombian case, and 57.0%, 33.9% and 56.2% for the Ecuadorian case. In turn, the EI predictors explain 81.0% of its variance for the model associated with the Colombian sample and 79.7% of its variance for the Ecuadorian model.

5. Discussion and conclusions

The decision to pursue a career as an entrepreneur is a process of successive levels of engagement, and the commitment to education is one of them because better-educated people move more easily through the process. Entrepreneurship education consists of any pedagogical program or training that develops entrepreneurial attitudes, skills, and values necessary to manage an entrepreneurial initiative and stimulate intentions to start a business. This study is especially relevant because the findings highlight the importance of education and students' entrepreneurial orientation. Previous studies emphasize that when they face the same opportunities, those individuals with an entrepreneurial orientation may decide differently compared to peers who lack this orientation (Ma et al., 2021).

One of the main assumptions of entrepreneurship programs should be to promote the conditions for developing entrepreneurial skills in the classroom. However, the research on the relationship between entrepreneurship education and entrepreneurial intention sometimes presents not congruent results (Nabi et al., 2017). Such diversity in results showed positive effects of education on intention (e.g., Martin et al., 2013; Sánchez, 2013; Souitaris et al., 2007), but also indicated that the relationship is not confirmed (e.g., Lima et al., 2015; Rideout & Gray, 2013). Our findings add an interesting element to the discussion on the impact of entrepreneurial education courses. The empirical evidence from this study suggests that entrepreneurial education primarily impacts skills development and first drives entrepreneurial orientation rather than directly generating entrepreneurial intention. The intention, in turn, will be the consequence of the initial development of entrepreneurial characteristics (innovativeness, proactiveness and risk-taking) mediated by personal traits and social norms.

Thus, this study has posed two main research questions: Do entrepreneurship education programs raise EIO? And could the IEO help to better explain the antecedents and entrepreneurial intention through the dimensions of the Theory of planned behavior? To address these questions, the study considers a pre- and post-course analysis. The results showed that after the entrepreneurship education program, the students increased their innovativeness, proactiveness and risk-taking. Such evidence is similar for both the Ecuadorian and Colombian cultural context, demonstrating the potential effect of entrepreneurship education on entrepreneurial orientation at the individual level, for which there is little evidence at present. In this vein, our results agree with the findings by Marques et al. (2018) regarding the effect of entrepreneurship education on innovativeness and proactiveness and contrast with their findings in terms of risk-taking. Our results also corroborate, to some extent, what Sánchez (2013) pointed out in terms of the positive effect of entrepreneurial education on proactiveness and risk-taking, in this case concerning secondary education.

Nevertheless, what conclusions do we draw from the importance of developing skills related to entrepreneurial orientation in the classroom? Innovativeness is crucial to identify and connect things that others would not be able to, and also to create an offer a range

of products and services with a certain degree of novelty and uniqueness for society. Likewise, it is justified as a key element for creativity and experimentation by providing original problem-solving approaches. Similarly, proactiveness enables individuals to plan on projects anticipating future problems, needs, or changes. The same in the ease of communicating and making alliances based on this ability to be the first to look for solutions instead of waiting for them. Risk-taking, in turn, is probably the least addressed among the three dimensions in entrepreneurship programs and, therefore, with the greatest potential for development. The development of risk-taking at the individual level includes the preparation of the students for the correct identification, evaluation, and tolerance of the risk inherent to entrepreneurial activity and the adequate evaluation of the risks for the most accurate decision-making process.

This study also shows how the dimensions of the theory of planned behavior exert a complete mediation in the IEO-entrepreneurial intention relationship. Such result supports the idea that intention is a further consequence of strengthened entrepreneurial characteristics (skills and knowledge) through education and beliefs - behavioral, normative and control aspects. Furthermore, individuals with a greater entrepreneurial orientation also have a more favorable attitude to self-employment and perceive it more feasible to carry out a venture. This finding reinforces the idea that the psychological traits associated with entrepreneurial characteristics are important predictors of an inclination towards entrepreneurship as a career option (Martins & Perez, 2020; Sánchez, 2013).

Also, other aspects should be included in the discussion in terms of the similarities and differences found in the relationships between education, orientation and intention for Colombia and Ecuador. Although there are more similarities than differences and that both countries share cultural values and especially perceptions about the entrepreneurial activity as previously highlighted, it is also necessary to mention other institutional aspects such as support and incentives for entrepreneurial activity. In this vein, Colombia presents a formal framework to promote the culture of entrepreneurship, especially with an emphasis on education, which is embodied in Law 1014 of 2006. Likewise, this legal framework to encourage entrepreneurship in the country has recently been expanded through the Law 2069 of 2020 to favor other aspects such as the incentive for the venture creation, strengthen the entrepreneurial ecosystem in general and supporting the early-stage financing. Ecuador, in turn, only in 2020, promulgates the Organic Law of Entrepreneurship and Innovation, intending to establish the regulatory framework that encourages entrepreneurship, innovation and technological development, promoting an entrepreneurial culture. As it is well known, entrepreneurship as a career option is one of the most optioned alternatives among the young population in Latin America and explain to some extent the recent growth of public policies and available agendas in the entrepreneurial ecosystem for the new technology-based ventures with the objective of promoting more entrepreneurship by opportunity in a region with an entrepreneurial vocation but with entrepreneurship by necessity in the forefront influenced by the high incidence of informal employment (59.74% for Colombia and 67.25% for Ecuador, for instance) (The World Bank, 2021).

6. Implications for theory

The study contributes at several levels of the emerging literature on entrepreneurship education and entrepreneurial intention. First, our results increase the explanatory power of entrepreneurship education by offering a more holistic theoretical framework, as suggested by Ratten and Usmanij (2020). Such results are achieved through the use of a traditional framework such as the Theory of planned behavior, but also incorporating an emerging construct at the individual level and still underexplored in the literature on entrepreneurship education: IEO. This paper is one of the first studies that apply the IEO to contribute to the literature on entrepreneurship education. The findings thus offer new evidence on the role of entrepreneurship education in developing competencies at the cognitive level of students, such as innovativeness, proactiveness and risk-taking.

Second, findings provide uniqueness in the role of the entrepreneurial orientation at the individual level as an antecedent of attitudes towards self-employment, subjective norms and perceived behavioral control. Offering thus, a new insight relating individual competencies for entrepreneurial activity and their impact on entrepreneurial intention through the Theory of planned behavior dimensions. Third, the findings also have implications for the emerging studies on IEO, because theoretically, it provides evidence that allows this construct to be related to another widely studied and validated construct such as entrepreneurial intention. Finally, a non-parametric analysis is introduced at the methodological level based on a two-stage measurement using a large sample in two countries. This analysis overcomes the difficulties in terms of validity and optimality widely recognized in parametric techniques, and its results are more robust and less dependent on outliers (Davis, 2002). In addition, the multigroup structural equation modeling analysis, which is consistent with the reflective measures used and the sample size, provides advantages over traditional techniques such as ordinary least squares estimation and offers findings that can be contrasted with samples in similar conditions.

7. Practical recommendations

In times of challenges for humanity as a whole; society must deal with aspects such as climate change and the need for responsible and sustainable development, population growth, political instability and violence, which results in huge waves of migration affecting developed countries, but also developing economies, as well as the growing inequalities accentuated by several social-economic crises and, more recently, the Covid-19 pandemic. Therefore, universities and higher education institutions have a fundamental role in training the current generation with skills to offer solutions to social problems with creativity, resilience, and innovation. Thus, perhaps an entrepreneurial stance and behavior become even more necessary than ever before in its broadest sense.

Given the increased number of people who want to become self-employed, especially in emerging economies such as Latin America and the Caribbean, where adults starting or running a new business is higher than in other regions around the world (Bosma et al., 2020), the entrepreneurial education programs can be considered an enabler. However, the reasons for teaching entrepreneurship as a compulsory and transversal course to all majors must contribute to the development of skills that may be useful for future professionals

with or without interest in a career as self-employed. In this vein, our study provides meaningful lessons for universities in terms of designing academic programs to promote individuals' innovativeness, proactiveness, and risk-taking propensity. Specifically, the cognitive aspects related to risk tolerance have not been sufficiently addressed in the design of entrepreneurship programs. Although entrepreneurship is an activity with a high level of risk, there is little empirical evidence considering the risk-entrepreneurial intention relationship. The propensity to take risks is essential to forge an entrepreneur because individuals (including entrepreneurs) are more sensitive to losses than gains when making decisions (Ma et al., 2021). Thus, our findings reinforce the importance of addressing risk in entrepreneurial education programs because risk-taking is a fundamental part of entrepreneurial orientation, and entrepreneurs make decisions under risk conditions.

Taking into account lessons learned from the universities included in this study in regards to the use of active teaching and learning methodologies, it is recommended to carry out follow-ups with the systematic pre- and post-course measurement of all program participants. Entrepreneurial education programs must constantly be updating their content and methodologies, and the best way to achieve this is through: a) carrying out a systematic measurement to observe what works and make the necessary changes; b) being attentive and in constant collaboration with the local entrepreneurial ecosystem, and c) aligning teaching and research to generate new training strategies and methods.

Entrepreneurship education is crucial for developing traits, skills and abilities such as innovativeness, proactiveness and risk-taking. However, higher education institutions that wish to implement an entrepreneurial push strategy should add activities to promote entrepreneurial orientation by connecting their students with the entrepreneurial ecosystem, active entrepreneurs and investors, and to generate competitions and entrepreneurial challenges to incubate early-stage ventures, among others.

8. Limitations and future research directions

The interpretation of the findings is subject to limitations that suggest further research. First, this study proposes an early approach to the relationship between entrepreneurship education programs and IEO by considering the direct effects in pretest-posttest analysis; hence, more research will be needed to fully understand how programs in entrepreneurship education can stimulate entrepreneurial orientation changes in terms of innovativeness, proactiveness and risk-taking. As mentioned above, specifically studies considering cognitive variables related to tolerance and risk-taking and their relationship with entrepreneurial intention are scarce to date. Second, although the results are robust for the two countries under analysis, there is a high proportionality of the Colombian sample, which could be justified by the experience of the Colombian university in collecting these data. For this reason, future research could include models with balanced samples considering emerging countries with similar educational conditions, thus providing a better understanding of the entrepreneurial phenomenon at the cognitive level. Third, despite offering empirical evidence with a considerable number of students observed in two emerging Latin American countries, for reasons of institutional policies of the universities participating in the study, it has not been possible to include control groups. In this vein, further studies should work applying an analysis by considering experimental and control groups such as the methodological design applied by Sánchez (2011, 2013). Fourth, if on the one hand entrepreneurial orientation and intention are fundamental for entrepreneurial behavior; on the other hand, they are not the end of the process. Therefore, longitudinal studies based on the accompaniment of students through the entrepreneurial journey and the move from intention-orientation towards action and start-up a business are still scarce and necessary in the entrepreneurship literature. Finally, entrepreneurial orientation at the individual level is a construct that is still underexplored, but with growing interest from academia in the last decade where there is a greater inclination for the three dimensions considered in our paper: innovativeness, proactiveness and risk-taking. In addition, it is a construct under development, and more studies are needed to validate its dimensions just mentioned and new dimensions proposed to the construct, such as perseverance and passion (Santos et al., 2020). In any case, more studies are necessary to test direct relationships and interaction relationships from the IEO. Likewise, more cross-cultural analyses and comparisons between students in developed and developing economies will be welcome to validate and understand the IEO construct in-depth. To do this, further studies using data from projects with a global scope, such as the Global University Entrepreneurial Spirit Students' Survey (GUESSS), can be a way to achieve this type of cross-cultural study.

Author statement

All three authors subscribed below confirm our participation in equal proportion in the different phases of the ideation and development process of this manuscript:

Conception and design of the work.
Data collection.
Data analysis and interpretation.
Drafting the article.
Critical revision of the article.
Final approval of the version to be submitted.
In addition, we make public our responsibility for the content of the work submitted for review.

Appendix

Measures of variables		
Construct	Question	Indicative
Innovativeness	Please indicate your level of agreement with the following sentences from 1 (total disagreement) to 7 (total agreement)	
	I often like to try new and unusual activities that are not typical but not necessarily risky	I1
	In general, I prefer a strong emphasis in projects on unique, one-of-a-kind approaches rather than revisiting tried and true approaches used before	I2
	I prefer to try my own unique way when learning new things rather than doing it like everyone else does	I3
	I favor experimentation and original approaches to problem solving rather than using methods others generally use for solving their problems	I4
Proactiveness	Please indicate your level of agreement with the following sentences from 1 (total disagreement) to 7 (total agreement)	
	I usually act in anticipation of future problems, needs or changes	P1
	I tend to plan ahead on projects	P2
	I prefer to "step-up" and get things going on projects rather than sit and wait for someone else to do it	P3
Risk-taking	Please indicate your level of agreement with the following sentences from 1 (total disagreement) to 7 (total agreement)	
	I like to take bold action by venturing into the unknown	R1
	I am willing to invest a lot of time and/or money on something that might yield a high return	R2
	I tend to act "boldly" in situations where risk is involved	R3
Entrepreneurial Intention	Please indicate your level of agreement with the following sentences from 1 (total disagreement) to 7 (total agreement)	
	I am ready to do anything to be an entrepreneur	EI1
	My professional goal is to become an entrepreneur	EI2
	I will make every effort to start and run my own firm	EI3
	I am determined to create a firm in the future	EI4
	I have very seriously thought of starting a firm	EI5
	I have the firm intention to start a firm some day	EI6
	I am saving money to start my own business	EI7
Attitude Towards Behavior	Please indicate your level of agreement with the following sentences from 1 (total disagreement) to 7 (total agreement)	
	Being an entrepreneur implies more advantages than disadvantages to me	ATB1
	A career as entrepreneur is attractive for me	ATB2
	If I had the opportunity and resources, I'd like to start a firm	ATB3
	Being an entrepreneur would entail great satisfactions for me	ATB4
	Among various options, I would rather be an entrepreneur	ATB5
Subjective Norms	If you decided to create a firm, would people in your close environment approve of that decision? Indicate from 1 (total disapproval) to 7 (total approval)	
	Your close family	SN1
	Your friends	SN2
	Your colleagues	SN3
Perceived Behavioral Control	To what extent do you agree with the following statements regarding your entrepreneurial capacity? Value them from 1 (total disagreement) to 7 (total agreement)	
	To start a firm and keep it working would be easy for me	PBC1
	I am prepared to start a viable firm	PBC2
	I can control the creation process of a new firm	PBC3
	I know the necessary practical details to start a firm	PBC4
	I know how to develop an entrepreneurial project	PBC5
	If I tried to start a firm, I would have a high probability of succeeding	PBC6

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