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Assessing the stability of graduates' entrepreneurial intention and exploring its predictive capacity

Stability of graduates'

77

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Abstract

Purpose – This is one of the first long-term studies on entrepreneurial intentions (EIs) and their role in predicting start-up. In entrepreneurship, the usefulness of intention models depends crucially on their stability over time. The purpose of this paper is to explore this issue in a cohort of university graduates.

Design/methodology/approach – Using a structural equation model (SEM), it addresses three research questions: whether EI and perceptions are stable over time; whether the pattern of relationships of the variables in the model remains stable over a three-year period; and whether intention accurately predicts entry into self-employment. A two-wave study was conducted with respondents being final year students at time 1 (T1), and part of the working/active adult population at time 2 (T2).

Findings – The results suggest that construct scores and the pattern of relationships between the variables are notably stable over the three-year period. The only partial exception is that of perceived behavioral control. Finally, EIs are found to significantly explain actual start-up behavior. Implications are derived for future research and entrepreneurship education and policy.

Research limitations/implications – The generalizability of the results cannot be claimed until these findings are replicated by additional samples from different segments of the population and in different contexts. In particular, the number of new entrepreneurs at T2 is small and results in this respect are to be taken with caution.

Originality/value – The value of this paper resides in its clarifying the conditions under which EIs and their antecedents remain stable over time, thus enabling actual start-up behavior.

Keywords Entrepreneurial intentions, Start-up, Behavioural prediction, Personal attitudes, University students, Planned behaviour

Paper type Research paper

Resumen

Propósito – Éste es uno de los primeros estudios a largo plazo sobre intenciones emprendedoras y su papel para predecir la creación de una empresa. En los estudios sobre emprendimiento, la utilidad de los modelos de intención depende crucialmente de su estabilidad a lo largo del tiempo. Este artículo explora esta cuestión en una cohorte de graduados universitarios.

Diseño/ Metodología/ enfoque – Gracias a un modelo de ecuación estructural, se abordan tres preguntas de investigación: si la intención y las percepciones emprendedoras son estables en el tiempo; si el patrón de relaciones entre las variables del modelo permanece estable en un periodo de tres años; y si la intención predice con precisión la entrada en el autoempleo. Se ha llevado a cabo un estudio en dos etapas, en la primera los encuestados eran estudiantes universitarios de último año (T1) y en la segunda formaban parte de la población adulta activa/trabajadora (T2).

Resultados – El trabajo realizado sugiere que tanto las puntuaciones asignadas a cada constructo, como el patrón de relaciones entre las variables son notablemente estables en el periodo de tres años.



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La única excepción parcial es el control conductual percibido. Finalmente, podemos indicar que las intenciones emprendedoras explican significativamente el comportamiento emprendedor efectivo. Se analizan las implicaciones para futuras investigaciones y para la política sobre educación emprendedora.

Limitaciones de la investigación – Los resultados no se pueden generalizar hasta que éstos no sean replicados en diferentes muestras con otros segmentos de población y en diferentes contextos. En particular, el número de nuevos emprendedores en T2 es pequeño y los resultados en este aspecto deben tomarse con cautela.

Originalidad/valor – El valor de este artículo reside en la clarificación de las condiciones bajo las cuales la intención emprendedora y sus antecedentes permanecen estables en el tiempo, haciendo así posible la efectiva realización del comportamiento emprendedor.

Keywords Intenciones Emprendedoras, Creación de empresas, Predicción del Comportamiento, Actitudes Personales, Estudiantes Universitarios, Comportamiento Planeado.

Introduction

Entrepreneurship is considered to be a process that occurs over time (Goethner *et al.*, 2012; Kautonen *et al.*, 2013; Liñán *et al.*, 2013b). The individual decision to start a business venture has long been seen as a fundamental milestone in the start-up process. More recently, cognitive models have received considerable attention as a very promising avenue for advancing this field (Krueger, 1993; Krueger *et al.*, 2000; Liñán *et al.*, 2011). According to authors such as Baron (2004) the cognitive perspective has much to offer in increasing understanding of the entrepreneurial process. Entrepreneurial cognition is a broad concept and may include many different topics among which Baron (2004) specifically includes the study of entrepreneurial intentions (EIs).

Several studies have applied intention models in an attempt to explain the decision to start a business venture. In particular, the applicability of the planned behavior approach (Ajzen, 1991) to entrepreneurship has consistently been corroborated (Krueger *et al.*, 2000; Autio *et al.*, 2001; Kolvereid, 1996). According to this view, intention is the single best predictor of start-up behavior. A number of studies have attempted to understand the factors and variables that explain intention, among which empirical analyses of EIs are increasingly common (Liñán and Chen, 2009; Moriano *et al.*, 2012; van Gelderen *et al.*, 2008).

However, very few efforts have yet been made to analyze the temporal progression of intention (i.e. whether intention is stable over time) or the intention-behavior link, using longitudinal analysis (Delanoë, 2013; Kautonen *et al.*, 2013; Laguna, 2013). Indeed, only in relation to educational effectiveness have changes in attitudes and intentions been measured. Thus, Souitaris *et al.* (2007) used a longitudinal design to measure the effectiveness of an entrepreneurship education program, though their study covered only a relatively short time span (five months from the first wave to the second). Similar research was carried out by Audet (2004). Longitudinal research over a more extensive time frame has been used in some entrepreneurship research (Aspelund *et al.*, 2005; Menzies *et al.*, 2006), but this has not tested the EI model.

There is, therefore, a notable scarcity of long-term longitudinal research on EIs (Laguna, 2013). The present study addresses this substantial gap in the literature. In 2004, an initial sample of final year university students was analyzed to identify the antecedents of their EIs. At that time, results confirmed the applicability of the EI model to entrepreneurship, explaining more than 50 percent of the variance in the dependent variable (Liñán and Chen, 2009; Liñán, 2008). Contact data were requested to enable follow-up of respondents. For this paper, students who had provided contact data in 2004 (84 percent of the original sample) were contacted again. A new questionnaire

was sent, measuring key intention-model constructs and inquiring about self-employment experience.

The paper addresses three specific research questions. The first relates to the temporal stability of EIs and its motivational antecedents (personal attitude (PA), subjective norm (SN) and perceived behavioral control (PBC)). As respondents in the first survey were in their final year of studies, a major change has taken place in their lives since they were first approached and their perceptions might have suffered substantial variation. The temporal stability of EIs under circumstances such as these is a major issue, especially given criticisms that have been raised about the use of student samples (Robinson *et al.*, 1991).

The second research question refers to the internal configuration of relationships between the latent variables in the model. Since this is one of the first long-term studies of EIs that uses the theory of planned behavior (TPB) as a reference framework. The longitudinal relationships between latent variables at the start of the study period and its end (time 1 (T1) and time 2 (T2)) are not known.

Finally, the third research question relates to the degree to which EI is a predictor of entry into self-employment. Structural Equation Models (SEM) were used to carry out a tentative analysis of the intention-behavior link.

Theoretical background

The decision to become an entrepreneur may plausibly be considered a voluntary and conscious process (Krueger *et al.*, 2000) that occurs over time (Goethner *et al.*, 2012; Kautonen *et al.*, 2013; Liñán *et al.*, 2013b). In this sense, EIs would be the first step in the evolving and sometimes drawn-out process of venture creation (Krueger *et al.*, 2000; Liñán *et al.*, 2013b). Looked at from this perspective, the intention to initiate a start-up would be considered the single best predictor of behavior (Ajzen, 1991, 2001; Fayolle *et al.*, 2006; Kolvereid, 1996).

The TPB

In turn, the intention of individuals to carry out entrepreneurial behaviors may be affected by several distal and proximal predictors (Goethner *et al.*, 2012). In particular, the cognitive variables influencing intention are called motivational “antecedents” by Ajzen (1991). A more favorable perception of these antecedents would increase the intensity of start-up intentions (Kolvereid, 1996; Krueger *et al.*, 2000; Liñán *et al.*, 2013b). Obviously, situational factors also have an indirect or distal influence on EIs (Goethner *et al.*, 2012). These external factors affect the individual’s attitudes toward entrepreneurship (Krueger, 1993). Examples of these situational factors might include variables such as time constraints, task difficulty, and the influence of other people exerted through social pressure (Liñán *et al.*, 2011).

According to the TPB, EI indicates the effort that an individual is ready to make to implement entrepreneurial behavior. Hence, it captures the three motivational factors, or antecedents, influencing behavior (Ajzen, 1991):

- (1) Attitude toward start-up (PA) refers to the degree to which the individual holds a positive or negative personal valuation about being an entrepreneur (Ajzen, 2001; Autio *et al.*, 2001; Kolvereid, 1996). This includes not only affective (“I like it, it is attractive”), but also evaluative considerations (“it has advantages”).
- (2) SN measures the perceived social pressure to carry out entrepreneurial behaviors, or not to. In particular, it refers to the perception that “reference

people” would (or would not) approve of the individual’s decision to become an entrepreneur (Ajzen, 2001).

- (3) PBC is defined as the perception concerning the ease or difficulty of becoming an entrepreneur. It is therefore a concept that is quite similar to self-efficacy (SE) or perceived feasibility (Krueger *et al.*, 2000). All three concepts refer to the sense of capacity regarding the fulfillment of firm-creation behaviors. However, recent work has emphasized the difference between PBC and SE (Ajzen, 2002a), the former including not only the feeling of being able to become an entrepreneur, but also perceptions about the controllability of the behavior.

The relative contributions of these three motivational factors in explaining EI are not established beforehand. The specific configuration of relationships between the constructs must be determined empirically for specific behaviors (Ajzen, 1991, 2002b). SN has been shown to exert the weakest influence on behavior (Armitage and Conner, 2001). This weak relationship is also found in the specific case of entrepreneurship (Liñán and Chen, 2009; Moriano *et al.*, 2012; Autio *et al.*, 2001). The literature on social capital suggests that values and norms transmitted by “important others” may affect motivations (Casson and Della Giusta, 2007). Thus, these values – received from others – may partly determine PA and PBC (Heuer and Liñán, 2013). These indirect influences have been reported with regard to entrepreneurship (Autio *et al.*, 2001; Liñán and Chen, 2009) and this modified EI model has been used as an evaluation tool in entrepreneurship education programs (Fretschner and Weber, 2013).

Results generally support the applicability of TPB to entrepreneurship, despite some conflicts. A significant percentage of these differences may be due to measurement issues (Chandler and Lyon, 2001). Thus, empirical tests have differed widely. Krueger *et al.* (2000) used single-item variables to measure each construct. Kolvereid (1996) used a belief-based measure of attitudes. More recently, Kolvereid and Isaksen (2006) have used an aggregate measure for attitudes, but a single-item one for intention. Similarly, some of these studies used an unconditional measure of intention (Autio *et al.*, 2001; Kickul and Zaper, 2000; Kolvereid and Isaksen, 2006; Krueger *et al.*, 2000; Zhao *et al.*, 2005), while others required participants to state their preferences and the estimated likelihood that they will pursue a self-employment career “as opposed to organizational employment” (Erikson, 1999; Fayolle *et al.*, 2006; Kolvereid, 1996). More recently, an entrepreneurial intention questionnaire (EIQ) has been developed based on an integration of psychology and entrepreneurship literature, as well as previous empirical research in the field (Liñán and Chen, 2009).

Conditions for predicting actual behavior

Since a major interest of entrepreneurship research is a better understanding of actual start-ups, the conditions for the accurate prediction of this behavior have to be considered. In this sense, Ajzen (1991) identified three of these conditions. First, the measured behavioral intention should correspond to the behavior to be predicted. Second, intentions must remain stable in the interval between their assessment and the observation of the behavior. Third, PBC should realistically reflect the actual control of behavior.

Thus, according to TPB, the realism and stability of PBC and EI become essential for an accurate prediction of start-up behavior. Yet, there has been very little research focused on the analysis of the stability of start-up intentions and attitudes (Kautonen *et al.*, 2013). One of the few exceptions is Sheeran *et al.* (1999). Although this work did

not refer specifically to start-ups the authors found that the stability of intentions does play a very significant moderating role in explaining the link between intention and behavior. However, the time interval for the two waves in their study was very short (five weeks). Audet (2004) used an 18-month time frame to try to assess the temporal stability of EIs, concluding that it is relatively weak. Dutta and Thornhill (2008) studied growth intentions over a five-year period, but this research was based on 30 in-depth interviews and the results of the study are qualitative. Overall then, very little research analyzes stability of intention, in particular using a longer term analysis. Consequently, the temporal stability of EIs remains to be established.

In a meta-analysis of the somewhat similar psychological concept of personality traits, performed by Schuerger *et al.* (1989), reliability was found to decline consistently over time: correlation coefficients between measures decreasing asymptotically toward 0.5. However, it has been argued that attitudes are less stable than personality traits (Wiklund *et al.*, 2003). In this sense, Souitaris *et al.* (2007) found, after five months, correlations ranging from 0.51 (for SN at T1 and T2) to 0.71 (for EI). In the present study – given the major changes which occurred in the respondents' educational and employment trajectory and the long time-frame of the study, attitudes and intentions may have changed substantially.

On the other hand, individuals are influenced by the values and beliefs held in their close environment which, according to the literature on social capital, might be associated with family or friends. From an early age, the close environment exerts its influence directly on the cognitive values and is likely to cement the beliefs that conform the individual's perceptions of potential careers (Grootaert and van Bastelaer, 2001; Uphoff, 2000). Consequently, PA and SN might be expected to be more stable, as other research suggests they are the result of socialization processes that take place at an early age (Liñán *et al.*, 2011).

On the other hand, human capital and other factors also influence intentions (Goethner *et al.*, 2012; Moriano *et al.*, 2012). In particular, greater knowledge of different entrepreneurial aspects surely contributes to more realistic perceptions about entrepreneurial activity (Ajzen, 2002a, b), thus indirectly influencing intentions. The relevance of experience and education has been widely highlighted, especially because of the increased knowledge it provides (Cooper, 1993). In general, superior knowledge is likely also to directly increase awareness about the existence of professional career options, as may be inferred by the importance attached to role models (Carrier, 2005; Matthews and Moser, 1995). This latter element probably also exerts influence on PBC and possibly on PA and SN as well (Scherer *et al.*, 1991).

In particular, prior work experience should act as a major source of practical entrepreneurial knowledge (Cooper, 1993). A major career change after graduation generally involves the acquisition of work experience; an experience that is likely to affect the individual's attitudes toward entrepreneurship. The effect of post-graduation changes (in particular, new work experience) might help individuals develop more realistic perceptions about behavioral control. This effect may, to a lesser extent, also be felt with regard to the other motivational antecedents. However, students typically gain work experience before or during their studies. For this reason, the change in perceptions may be relatively small.

Regarding the overall predictive capacity of intention, Sheeran (2002) reports a mean correlation of 0.53 between intention and behavior, while Armitage and Conner (2001) find a mean correlation of 0.47 in their meta-analysis of the efficacy of TPB.

This relationship has been confirmed in the specific case of venture start-ups (Kautonen *et al.*, 2013; Laguna, 2013; Delanoë, 2013).

Research hypotheses

Therefore, based on the review of the literature, we expect the following hypotheses to hold:

- H1. EI and its motivational antecedents remain stable from T1 to T2.
- H2. The internal pattern of the relationship between antecedents and EI remains stable from T1 to T2.
- H3. EI at T1 significantly predicts subsequent start-up behavior.

Material and methods

The longitudinal analysis was designed as a two-wave study (Raykov, 1999). T1 was November 2004, while T2 corresponds to the last quarter of 2007 and the beginning of 2008. Hence, the time interval ranges from 35 to 39 months. For the purposes of this study, we will refer to T1 as 2004 and to T2 as 2007, assuming a three-year interval.

Participants and procedure

The T1 survey was carried out through a questionnaire administered to final year undergraduate students, who are faced with choosing their professional careers. Consequently, their situation is especially relevant for the purposes of this study, since graduation implies a major life change and may be the cause of substantial modifications in career attitudes and intentions (Robinson *et al.*, 1991).

The sample at T1 was obtained from three public universities in Andalusia, a deprived region in southern Spain, with a per capita income below 80 percent of the national average. Start-up activity is comparable to other more developed regions in the country (De la Vega *et al.*, 2007), but the relative presence of necessity entrepreneurs is greater than that of opportunity entrepreneurs.

Two of the universities are located within the metropolitan area of Seville, which has more than 1.2 million inhabitants. The third is located in a medium-sized town in a rural area. The final T1 sample consisted of 400 students: 46 from University 3, 31 from University 2, and the remaining 323 from University 1. This distribution within the sample corresponds roughly to the total number of students at each university. Of the overall sample, 69.2 percent were business students and the rest were studying economics. In total, 55 percent of respondents were women, and the average age was 23.7. This distribution is broadly similar to the general characteristics of the population under study (Spanish final-year social science students). The sample can therefore be considered representative.

Questionnaires were administered in class. Students were briefed on the purpose of the study by a member of the research team, and then asked to voluntarily fill in the EIQ. Questionnaires were anonymous, but contact data was requested from respondents who expressed an interest in participating in the project follow-up, as is standard in such research (Kautonen *et al.*, 2013). A total of 336 students (84.0 percent) provided contact data. Both groups (those that did and did not provide contact data) were compared. The only significant differences between the groups related to age (23.37 for those who provided contact data vs 24.95 for those who did not) and prior work experience (45.8 vs 31.3 percent).

Second-wave data collection

In September 2007, a new questionnaire was sent by post to all the participants who had previously provided a postal address. In October, an electronic version was e-mailed to those who had not provided an address or had not been found (postal letter returned). In November 2007, a phone call was made as a reminder. By December 2007, a total of 117 matched questionnaires had been received. In an attempt to increase the response rate, a second round of phone calls and e-mails was made to non-respondents, yielding 31 additional responses by February 2008.

A total of 148 matched questionnaires were received. However, 13 of these were discarded due to missing data, resulting in a final response rate of 40.2 percent (135 out of 336), which may be considered acceptable. As a reference, Kautonen *et al.* (2013) reported a response rate of 37.3 percent over a similar three-year period, while Audet's (2004) response rate was 35.3 percent over 18 months and Souitaris *et al.* (2007) record 55.3 percent over a five-month period.

Nevertheless, since responses at T2 were obtained over a relatively long timespan, a test was carried out to confirm there were no differences between them. No statistical differences were found between responses up to December 2007 and those obtained in January and February 2008. Thus, it was possible to use the full sample of 135 usable matched questionnaires for the analysis.

Statistical differences between participants and non-participants in the follow-up were sought. Only age (23.18 years of age for T2 participants vs 23.86 for all others) was significant at the 95 percent confidence level ($p < 0.05$). No differences were found with respect to gender, degree course studied, prior work experience, role models, income level, parental occupations and educational levels at T1.

Measures

The EIQ used for this study (relevant scales included in the Appendix) had previously been used by Liñán and Chen (2009), who validated it and assessed its psychometric properties. EI was measured using a Likert-type scale with five items involving general sentences indicating behavioral aspects of intention (Armitage and Conner, 2001).

PA was also measured using a five-item attitude scale, an approach that had been employed before (Goethner *et al.*, 2012; Krueger *et al.*, 2000). SN was measured using a three-item scale referring to three groups of "reference people" (family, friends and colleagues). Finally, PBC was measured using a six-item scale including SE and controllability elements, as suggested by Ajzen (2002a).

Control variables were measured using dichotomic variables (see the Appendix for the complete set of questionnaire items): gender (0 = woman; 1 = man); prior work experience (0 = no; 1 = yes); self-employment experience (0 = no; 1 = yes); or personal acquaintance with an entrepreneur (role model, 0 = no; 1 = yes).

The same scales were used in T1 and T2 for the key constructs to measure motivational antecedents and intention, together with some items designed to capture demographic information, role models, employee or self-employed experience (control variables). Additionally, contact data were requested at T1, and again at T2 to allow for future follow-up. The descriptive statistics and correlations are reported in Table AI.

Data analysis

The temporal stability of a variable may be measured by examining its relative stability (degree of similarity in score rankings over time). This has traditionally been tested using test-retest reliability (Cronbach and Meehl, 1955). However, relative

stability alone may not provide sufficient data, as correlation coefficients refer only to the degree of similarity in score rankings over time (Sjöberg and Sverke, 2001). That is, they reveal only the relative, not the absolute, positions of individuals in groups (Newton and Keenan, 1991). Absolute stability may be assessed by comparing the mean values of the variables at T1 and T2. Any significant difference would indicate a lack of stability (Cronbach and Meehl, 1955; Newton and Keenan, 1991). Alternatively, linear regression models may also be useful in assessing temporal stability (De Gucht *et al.*, 2004): if the T1 construct has a positive and significant coefficient explaining the T2 construct, and it explains a substantial share of the variance, stability might be claimed.

SEM was used to analyze the relationships between the model constructs. In particular, a multivariate analysis technique based on partial least squares (PLS) was employed. When exploratory studies are carried out and relatively small samples are used, PLS is more suitable than other techniques such as LISREL, which is based on analysis of covariance (Roldán and Sánchez-Franco, 2012). The SEM statistical analyses were carried out using PLS-Graph v.3.00 software (Chin and Frye, 2003). PLS analysis provided results both for the measurement model – reliability and validity of indicators – and the structural model – hypothesized relationships (Sosik *et al.*, 2009). Regarding the measurement model, significant levels for factor loadings were estimated using a bootstrapping resampling procedure (Chin, 2010; Sosik *et al.*, 2009).

Results

Less than half of the original sample at T1 had prior work experience (43.5 percent) – acquired while they were still studying. On the other hand, very few had been self-employed at that time (ten respondents, 2.5 percent of the T1 sample). Three years later, things had changed significantly. Regarding prior work experience, the great majority of respondents at T2 had been employed (128 out of 135, 94.8 percent). On average, T2 occurred two years after they finished their degrees. Given the economic expansion enjoyed by Spain during that period, it was to be expected that most of would have been able to find a job. Self-employment is still rare, though, as only 14 respondents reported having been self-employed after 2004. Nevertheless, this figure represents a substantial increase compared to T1 data (10.4 percent of the T2 sample).

It is interesting to compare the responses at both moments. Only three of the ten students who were self-employed at T1 participated in the follow-up and only two of these reported self-employment after 2004. The other 12 positive responses at T2 are ex-novo entrepreneurs. This could serve as an indication that finishing a degree provides a good “strategic window” for starting up (Harvey and Evans, 1995).

Stability of the constructs

Factor analyses were computed to obtain the scores for each latent variable, using principal component analysis and varimax rotation. First, these analyses were carried out for the full T1 sample (with a Kaiser-Meyer-Olkin value of 0.920, and a satisfactory Bartlett’s sphericity test: $\chi^2 = 6,006.85$; $df = 190$; $p < 0.001$; cumulative variance explained = 73.1 percent). Four factors emerged that were fully in accordance with the theory. The factor analyses were then repeated to include only the matched questionnaires, for both the T1 (KMO = 0.906, Bartlett’s test: $\chi^2 = 2,250.84$; $df = 190$; $p < 0.001$; cumulative variance explained = 74.8 percent) and the T2 response sets. For the T2 sub-sample, however, only three factors had eigenvalues > 1 . In this case, following the theory, a four-factor solution was forced (KMO = 0.923, Bartlett’s

test: $\chi^2 = 2,806.61$; $df = 190$; $p < 0.001$; cumulative variance explained = 80.1 percent) and, again, results fully confirmed the scales used. It may be assumed, then, that the TPB constructs present a considerable level of factorial stability over time.

H1 was tested by analyzing relative and absolute stabilities. Relative stability was measured using test-retest correlation coefficients. Table I presents the correlation between the two measures of each construct (T1 and T2). As may be seen, all correlations are high and statistically significant. These results are comparable to those reported by Schuerger *et al.* (1989) and Souitaris *et al.* (2007), confirming the satisfactory stability of perceptions among respondents.

Absolute stability is present for three of the four variables studied. The only significant difference is found with respect to PBC. The absolute level of the self-assessed capacity to start a firm increased notably between T1 and T2 (+0.622), and this difference is highly significant ($p < 0.001$). Since relative stability is also high, it may be concluded that respondents keep their relative position in the ranking, but they tend to show higher PBC levels.

Why was PBC the only variable to increase? A first explanation would be that prior work experience or contact with role models increases the feeling that it might be possible to start a business. In this sense, Figure 2 (below) shows that prior work experience gained before graduation (T1) significantly explains PBC. Nevertheless, when T2 data are considered the correlation between prior work experience (or, for that matter, acquaintance with a role model) and PBC is not significant (possibly because the vast majority of respondents have prior work experience and know a role model). Harvey and Evans (1995) introduced the concept of the strategic window and explained that people become aware of these windows only at certain moments in time. In our opinion, the great majority of undergraduate students surveyed were insufficiently conscious of the entrepreneurial career options open to them. Besides, the degrees they were studying tend to prepare students to work as employees, and not entrepreneurs. Both aspects may have affected T1 responses and induced a low self-perceived control of start-up behavior. Additionally, it may tentatively be suggested that the kind of job found is probably very relevant. At the same time, even those without prior work experience may have increased PBC during their search for work.

An obvious implication may be derived from this that is relevant to entrepreneurship education. It would suggest, firstly, the need to include entrepreneurship education in primary and secondary schools. Greater efforts should be made to enhance the attractiveness of entrepreneurship at earlier stages in the education system. Developing the skills and values most closely linked with entrepreneurship (such as independence, self-realization, self-confidence, creativity, etc.) in younger students would contribute to a more favorable PA toward this career option (Volery *et al.*, 2013). At the same time, at undergraduate and post-graduate levels, entrepreneurship initiatives should include

	T1		T2		Stability	
	Mean	SD	Mean	SD	Relative	Absolute
Entrepreneurial intention	3.656	1.605	3.628	1.701	0.623***	-0.027
Personal attitude	4.707	1.383	4.687	1.326	0.505***	-0.019
Subjective norm	5.763	1.022	5.684	1.183	0.550***	-0.079
Perceived behavioral control	3.728	1.174	4.351	1.127	0.590***	+0.622***

Notes: T1, initial wave of the study (2004); T2, final wave of the study (2007). SD, standard deviation. Significance levels: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table I.
Stability of the theory
of planned behavior
constructs over time

some elements specifically conceived to increase PA and SN (Honig, 2004). Otherwise, they run the risk of being highly ineffective.

Recent research (Vanevenhoven and Liguori, 2013) has highlighted the need to study the impact of entrepreneurship education comprehensively. Nevertheless, methodologically sound evaluations of entrepreneurship education programs are very scarce (Rideout and Gray, 2013). In this sense, Fayolle and Gailly (2015) strongly suggest the use of intention models as a standard and rigorous evaluation instrument.

Stability in the pattern of relationships

H2 refers to the stability of the TPB over time. Consequently, a SEM seems to be the most adequate instrument to test this hypothesis. The results from the measurement model are presented in Figure 1. The constructs have been built using the scales in the questionnaire. Item loadings in each construct are always above the suggested 0.7 threshold (Nunnally, 1978). Reliability (composite reliability and Cronbach's α) and validity (average variance extracted) indicators for the measurement model were found to be satisfactory, as reported in Table AII.

The results for the structural model were notably robust, since the TPB-construct coefficients at T1 and T2 were very similar and significance levels nearly the same. Of special interest is the amount of variance explained at T2. The T1 level of each construct is always a significant regressor for the same construct at T2, helping to explain more than 30 percent of the variance. In particular, the coefficient between EI_{T1}

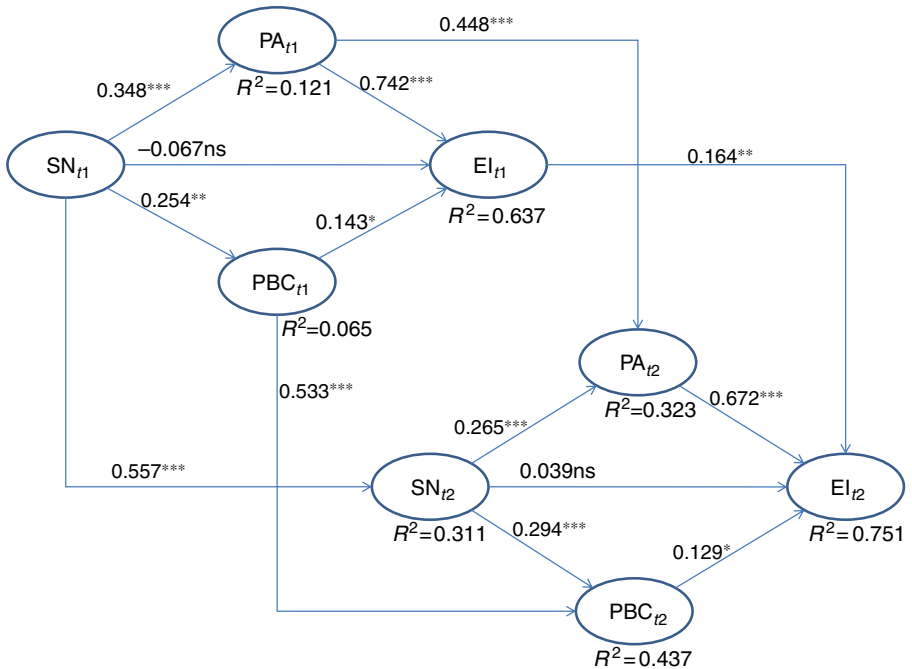


Figure 1.
Entrepreneurial
intention model
over time

Notes: Subscript *t1* denotes a variable measured at year 2004, while *t2* denotes a variable measured at year 2007. R², coefficient of determination; PA, personal attitude towards start-up; SN, subjective norm; PBC, perceived behavioral control; EI, entrepreneurial intention. Significance levels: ns, not significant; * = $p < 0.05$; ** = $p < 0.01$; *** = $p < 0.001$

and EI_{t2} is relatively low, despite the fact these two constructs have the highest correlation (see Table I). This should be because EI_{t2} is explained by PA_{t2} and PBC_{t2} , which are themselves explained by PA_{t1} and PBC_{t1} . The non-significant result for the SN-EI relationship, both at T1 and T2, deviates from the original TPB, but has been found before in the entrepreneurship research (Autio *et al.*, 2001; Goethner *et al.*, 2012; Krueger *et al.*, 2000; Liñán and Chen, 2009).

It has been argued that this might be because social and cultural variables may exert a considerable influence on the configuration of attitudes (Mitchell *et al.*, 2000). The transmission of values and beliefs through strong network ties (family, friends, ethnic group and so on) may be very relevant in the configuration of these perceptions (Grootaert and van Bastelaer, 2001; Uphoff, 2000). Cultural socialization processes, and the formation of the self-image of an individual, might take place at an earlier stage of life, and therefore would not be easily modified after graduation (Laspita *et al.*, 2012). This would explain why PA and SN remained stable over the three-year period of the study.

The stability of relationships between the model constructs ($H2$) was clearly expected. However, it is interesting to note that path coefficients were very similar at T1 and T2, adding robustness to the EI model, and contributing to reinforcing the satisfactory applicability of the instrument adopted.

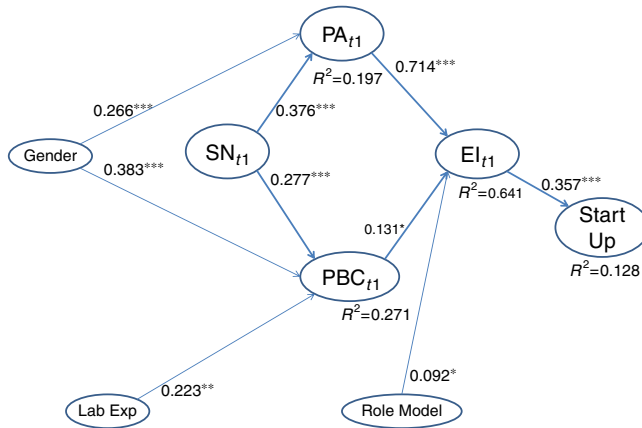
Since the objective of PLS is to maximize explained variance rather than fit, no obvious goodness-of-fit measure is available. It is recommended to use R^2 -values to evaluate PLS models (Chin, 1998). Together with the average R^2 of endogenous latent variables, communality and redundancy indices have also been suggested and a composite goodness-of-fit index has even been proposed (Tenenhaus *et al.*, 2005; Vinzi *et al.*, 2010). In the model used to test $H2$, the average indices for R^2 (0.378), communality (0.760) and redundancy (0.208) result in a goodness-of-fit index of 0.536. Although no well-established threshold levels for these indices are yet available, the results are higher than those reported by Tenenhaus *et al.* (2005).

Exploring the intention-action link

Finally, to test $H3$ we used the information regarding start-up experience after 2004. Figure 2 summarizes the results of the SEM. A number of control variables (age, gender, prior work experience and role model – all measured at T1) were included as potentially affecting the central constructs of the model. A backward stepwise method was used, eliminating one non-significant path at every step. Only statistically significant path coefficients are included in Figure 2. Again, reliability and validity indicators for the measurement model are included in Table AIII. Item loadings at each construct were always above 0.7, except for item 13c in SN_{t1} , which was 0.6515. However, values above 0.6 may in fact be acceptable for newly developed measures (Nunnally, 1978).

Turning to the results of the structural model, only gender, prior work experience and personal contact with a role model had significant influences on some of the constructs. Furthermore, both the paths from SN-EI and from PBC to Start-Up were included in the analysis, as established by the theory, but they were non-significant and have consequently been eliminated from Figure 2.

Average indexes for R^2 (0.373), communality (0.726) and redundancy (0.205) were computed, providing a goodness-of-fit index of 0.521 (Tenenhaus *et al.*, 2005; Vinzi *et al.*, 2010). Again, these results are more favorable than those reported by Tenenhaus *et al.* (2005). However, despite evidence of adequate model specification, the number of respondents who had started a company at T2 is small. Therefore, these results should probably be taken as exploratory in nature.



Notes: Subscript *t1* denotes a variable measured at year 2004. *R*², coefficient of determination; PA, personal attitude toward start-up; SN, subjective norm; PBC, perceived behavioral control; EI, entrepreneurial intention; Lab Exp, labor experience. Significance levels: *=*p*<0.05; **=*p*<0.01; ***=*p*<0.001

Figure 2.
Prediction of start-up behavior from the TPB

Even though the degree of start-up variance explained by EI is limited (12.8 percent), these results do provide a partial confirmation of the TPB. The theory also predicts a significant relationship between PBC and start-up, but such a link would depend on the realism of perceptions (Ajzen, 1991, 2002b). The results show, though, that PBC has been the only significant antecedent of intention to change between T1 and T2. This may be considered as an indication that T1 feasibility perceptions were not sufficiently realistic. That is, the undergraduates' self-image about their ability and capacity to effectively start a venture were not sufficiently accurate. This would help explain why this construct is the only one which experienced a significant absolute increase during the three-year period between T1 and T2. In this respect, critics of using student samples may be justified when PBC measurement is involved: it is a limitation.

The intention-behavior link is the least tested aspect of TPB (Armitage and Conner, 2001). In the specific area of entrepreneurship, attempts to measure this link have been limited (Kautonen *et al.*, 2013; Kolvereid and Isaksen, 2006). The need to carry out longitudinal studies, which are costly in time and money, is undoubtedly a major difficulty. In spite of this, once TPB has been accepted as a useful instrument in the analysis of the start-up process, a deeper knowledge of the cognitive process that leads to venture creation is required.

Ajzen (1991) identified three conditions for accurate behavioral prediction: construct validity (the measured intention closely corresponds to the behavior), stability of intentions, and realistic behavioral control perceptions. The extent to which these conditions are met with respect to entrepreneurship remains to be tested.

The present study was intended to contribute to the relevant literature. A first concern was to ensure construct validity. Several different research instruments are available for this purpose. The decision to use the EIQ (Liñán and Chen, 2009) was based on its strong theoretical basis and the favorable results of the validation process. Our own results confirm that the psychometric properties of this research instrument are satisfactory.

Limitations

Finally, the present study suffers from a number of limitations that it is important to acknowledge. First, the sample size and response rates were not sufficiently large to ensure the full generalizability of results. Although the initial sample was made up of 400 individuals, that of the longitudinal study was notably smaller. In particular, only 14 respondents had been self-employed after T1. Deriving strong general conclusions from such a small sample could be risky, although not unprecedented (Laguna, 2013).

A second limitation derives from the population of reference. The study was conducted in Andalusia, a relatively undeveloped region of Spain characterized by traditional cultural values that do not necessarily favor entrepreneurship (Liñán *et al.*, 2011). As Liñán *et al.* (2013a) have suggested, varying national cultural patterns may result in different types of entrepreneurs. As a consequence, additional studies should be carried out to confirm the results reported here, using culturally diverse samples. Similarly, all respondents were business/economics students at T1. The extent to which the discipline studied may affect the pattern of responses is not known. In the same vein, the economic situation may have also affected responses. At T2 (2007) Spain was still enjoying an economic expansion, and more opportunities for business start-ups were available. Future research carried out in a recession/crisis could offer relevant insights into the influence of the economic cycle on the intention-behavior link.

Third, actual behavior is measured using the declarations of respondents who answered the questionnaire. Assuming the answers given were honest, differences in interpretation may still be relevant and the dependent variable may in fact be measuring differing behaviors.

Similarly, studies based on samples of students are always controversial – though some authors have supported their use (Krueger, 1993). In particular, it is plausible that students' responses may differ from those of the general adult population (Laguna, 2013; Robinson *et al.*, 1991). Still, when they responded to the second questionnaire at T2, the members of the sample were no longer students. In this sense, the fact that most constructs are stable and the relationships remain essentially the same could be interpreted as a confirmation of the suitability of student samples though the evolution of PBC (commented above) would indicate the opposite. Therefore, our recommendation would be to handle student samples with extreme care, if they are used at all.

Conclusions

There is a notable lack of long-term longitudinal studies of EIs. In particular, the intention-behavior link has very rarely been examined. We believe this paper makes a substantial contribution to the field in three respects. First, it is a long-term longitudinal study. Second, it analyzes perceptions and the conditions required for accurate prediction. Third, it considers the actual implementation of start-up behavior and the role of intention in explaining it.

A number of conclusions may be drawn from the results. The high stability of PA and SN is very important as they are likely to be formed at an earlier stage of life and, therefore, are hardly altered after graduation. The possibility arises, though, that programs specifically designed to modify affective and evaluative considerations concerning entrepreneurship may have some effects. Concerted efforts should also be made to increase the social valuation of entrepreneurship. Previous research has shown that a more positive social valuation in some regions contributes to increasing SN and even PBC (Liñán *et al.*, 2011).

On the other hand, perceptions about behavioral control are found to be unrealistic in the T1 sample of university students. This may be because most students are not excessively concerned about their future career paths until they finish their studies. It may also reflect the orientation of the curriculum in business and economics degrees (at least in the country studied), which prepares students to be employees rather than entrepreneurs.

The implications for entrepreneurship education are very important, not only with respect to PBC. Typical business planning courses are insufficient (Honig, 2004). They may increase self-perceived efficacy, but this alone does not guarantee an effect on intentions. The need to raise PA and SN levels has to be addressed within specific contents.

This paper has shed light on a very important issue that could potentially make a significant contribution to understanding the pre-start-up cognitive process of entrepreneurs better. Certainly, there is still much to learn before we may fully understand the mental processes that lead to a start-up decision. However, research such as this could make a substantial contribution to this endeavor. The promising results obtained should be considered to be a call for further studies that might contribute to advancing knowledge in the field.

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(The appendix follows overleaf.)

A1. Items used to measures core constructs in the entrepreneurial intention model, and controls.

Personal attitude

1. Indicate your level of agreement with the following sentences from 1 (total disagreement) to 7 (total agreement).

	1	2	3	4	5	6	7
1.a- Being an entrepreneur implies more advantages than disadvantages for me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.b- A career as an entrepreneur is attractive for me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.c- If I had the opportunity and resources, I'd like to start a firm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.d- Being an entrepreneur would entail great satisfactions for me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.e- Among various options, I would rather be an entrepreneur	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Subjective norm

2. 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).

	1	2	3	4	5	6	7
2.a- Your close family	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.b- Your friends	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.c- Your colleagues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Perceived behavioral control

3. To what extent do you agree with the following statements regarding your entrepreneurial capacity?

Value them from 1 (total disagreement) to 7 (total agreement).

	1	2	3	4	5	6	7
3.a- To start a firm and keep it working would be easy for me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.b- I am prepared to start a viable firm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.c- I can control the creation process of a new firm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.d- I know the necessary practical details to start a firm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.e- I know how to develop an entrepreneurial project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.f- If I tried to start a firm, I would have a high probability of succeeding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Entrepreneurial intention

4. Indicate your level of agreement with the following statements from 1 (total disagreement) to 7 (total agreement)

	1	2	3	4	5	6	7
4.a- I am ready to do anything to be an entrepreneur	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.b- My professional goal is to become an entrepreneur	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.c- I will make every effort to start and run my own firm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.d- I am determined to create a firm in the future	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.e- I have very seriously thought of starting a firm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.f- I have the firm intention to start a firm some day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Controls

5. Gender: Male Female
6. Have you got labor experience (have worked or are working presently)? Yes No
7. Have you ever been self-employed (independent worker or firm owner)? Yes No
8. Do you personally know any entrepreneur? Yes No

Table A1.
Descriptive statistics
and correlations

	Mean	SD	Min.	Max.	1	2	3	4	5	6	7	8	9	10	11
1 Gender	0.44	0.50	0	1	1										
2 Lab.Exp.	0.42	0.50	0	1	0.06	1									
3 Role model	0.87	0.34	0	1	-0.05	0.07	1								
4 PA-T1	4.71	1.38	1.20	7	0.24**	0.12	0e.10	1							
5 SN-T1	5.76	1.02	3.00	7	-0.07	0.03	0.09	0.35***	1						
6 PBC-T1	3.73	1.17	1	6.66	0.37***	0.25**	0.09	0.48***	0.25**	1					
7 EntInt-T1	3.66	1.60	1	7	0.22**	0.18*	0.17*	0.79***	0.23**	0.48***	1				
8 PA-T2	4.69	1.33	1.41	7	0.25**	0.14	0.00	0.51***	0.24**	0.24**	0.59***	1			
9 SN-T2	5.68	1.18	1.37	7	0.00	0.10	0.04	0.22*	0.56***	0.21*	0.22**	0.36***	1		
10 PBC-T2	4.35	1.13	2	7	0.19*	0.26**	0.11	0.37***	0.26**	0.59***	0.40***	0.47***	0.41***	1	
11 EntInt-T2	3.62	1.70	1	7	0.18*	0.21*	0.08	0.47***	0.28**	0.32***	0.62***	0.84***	0.37***	0.53***	1
12 StartUp	0.10	0.31	0	1	0.09	0.15	-0.01	0.29**	0.16	0.23**	0.36***	0.31***	0.22*	0.28**	0.39***

Notes: T1, variable measured at year 2004; T2, variable measured at year 2007; PA, personal attitude toward start-up; SN, subjective norm; PBC, perceived behavioral control; EntInt, entrepreneurial intention. Significance levels: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

	T1			T2		
	Loading	AVE	Composite reliability	Loading	AVE	Composite reliability
<i>Personal attitude</i>		0.798	0.952		0.860	0.961
A1a	0.8332***			0.8377***		
A1b	0.9081***			0.9215***		
A1c	0.9193***			0.9350***		
A1d	0.9051***			0.9213***		
A1e	0.8983***			0.9315***		
<i>Subjective norm</i>		0.692	0.869		0.805	0.925
A2a	0.8559***			0.8640***		
A2b	0.9131***			0.9117***		
A2c	0.7132***			0.9158***		
<i>Perceived behavioral control</i>		0.678	0.926		0.811	0.945
A3a	0.7785***			0.7706***		
A3b	0.8406***			0.8490***		
A3c	0.9219***			0.9264***		
A3d	0.7063***			0.9184***		
A3e	0.8470***			0.9072***		
A3f	0.8286***			0.8102***		
<i>Entrepreneurial intention</i>		0.816	0.964		0.870	0.976
A4a	0.8734***			0.8976***		
A4b	0.9230***			0.9393***		
A4c	0.9377***			0.9630***		
A4d	0.9286***			0.9462***		
A4e	0.8754***			0.9182***		
A4f	0.8784***			0.9301***		

Notes: AVE, average variance extracted. Significance levels: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$, based on a 500 bootstrapping resampling procedure

Table AII.
Reliability and
validity indicators
(Model 1)

ARLA
28,1

98

	Loading	AVE	Composite reliability
<i>Personal attitude (T1)</i>		0.782	0.947
A1a	0.8377***		
A1b	0.9016***		
A1c	0.8972***		
A1d	0.8878***		
A1e	0.8949***		
<i>Subjective norm (T1)</i>		0.650	0.846
A2a	0.8691***		
A2b	0.8774***		
A2c	0.6515***		
<i>Perceived behavioral control (T1)</i>		0.668	0.923
A3a	0.7706***		
A3b	0.8576***		
A3c	0.9039***		
A3d	0.7160***		
A3e	0.8324***		
A3f	0.8102***		
<i>Entrepreneurial intention (T1)</i>		0.781	0.955
A4a	0.8285***		
A4b	0.9145***		
A4c	0.9172***		
A4d	0.9195***		
A4e	0.8476***		
A4f	0.8724***		

Table AIII.
Reliability and
validity indicators
(Model 2)

Notes: AVE, average variance extracted. Significance levels: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$, based on a 500 bootstrapping resampling procedure

About the authors

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