

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

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### Structured Abstract:

**Purpose:** This is one of the first long-term studies on entrepreneurial intentions and their role in predicting start-up. In entrepreneurship, the usefulness of intention models depends crucially on their stability over time. This paper explores this issue in a cohort of university graduates.

**Design/methodology/approach:** Using a structural equation model, it addresses three research questions: whether entrepreneurial intention 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, entrepreneurial intentions are found to significantly explain actual start-up behavior. Implications are derived for future research and entrepreneurship education and policy.

**Research limitations:** 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 entrepreneurial intentions and their antecedents remain stable over time, thus enabling actual start-up behavior.

**Keywords:** Entrepreneurial intentions; Start-up; Behavioral Prediction; Personal Attitudes; University Students; Planned behavior.

**Article Classification:** 3610; 3650; M13.

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**Running Heads:**

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

### **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.

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 entrepreneurial intentions are increasingly common ([Liñán and Chen, 2009](#); [Morianio \*et al.\*, 2012](#); [van Gelderen \*et al.\*, 2008](#)).

However, very few efforts have yet been made to analyze the temporal progression of intention (that is, 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 entrepreneurial intention model.

There is, therefore, a notable scarcity of long-term longitudinal research on entrepreneurial intentions ([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 entrepreneurial intentions. At that time, results confirmed the applicability of the entrepreneurial intention model to entrepreneurship, explaining more than 50% 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% 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 entrepreneurial intentions and its motivational antecedents (personal attitude, subjective norm and perceived behavioral control). 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 entrepreneurial intentions 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 entrepreneurial intentions that uses the Theory of Planned Behavior as a reference framework. The longitudinal relationships between latent variables at the start of the study period and its end (Time 1, or T1 and Time Two, or T2) are not known.

Finally, the third research question relates to the degree to which entrepreneurial intention is a predictor of entry into self-employment. Structural Equation Models 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, entrepreneurial intentions 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 Theory of Planned Behavior***

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 entrepreneurial intentions ([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 Theory of Planned Behavior (TPB), entrepreneurial intention (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](#)):

- *Attitude towards start-up (Personal Attitude, 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”).
- *Subjective Norm (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](#)).
- *Perceived Behavioral Control (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 entrepreneurial intention 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 entrepreneurial intention 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. Secondly, intentions must remain stable in the interval between their assessment and the observation of the behavior. Thirdly, 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 (5 weeks). [Audet \(2004\)](#) used an 18-month time frame to - try to assess the temporal stability of entrepreneurial intentions, concluding that it is relatively weak. [Dutta and Thornhill \(2008\)](#) studied growth intentions over a 5-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 entrepreneurial intentions 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 towards 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 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: Entrepreneurial intention and its motivational antecedents remain stable from T1 to T2.

H2: The internal pattern of the relationship between antecedents and entrepreneurial intention remains stable from T1 to T2.

H3: Entrepreneurial intention 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% 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% were business students and the rest were studying Economics. 55% 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%) 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%).

### ***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 emailed 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 emails 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% (135 out of 336), which may be considered acceptable. As a reference, Kautonen *et al.* (2013) reported a response rate of 37.3% over a similar three-year period, while Audet's (2004) response rate was 35.3% over 18 months and Souitaris *et al.* (2007) record 55.3% over a 5-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% 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 Appendix A1) 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 5-item attitude scale, an approach that had been employed before ([Goethner et al., 2012](#); [Krueger et al., 2000](#)). SN was measured using a 3-item scale referring to three groups of “reference people” (family, friends and colleagues). Finally, PBC was measured using a 6-item scale including self-efficacy and controllability elements, as suggested by [Ajzen \(2002a\)](#).

Control variables were measured using dichotomic variables (see Appendix A1 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 Appendix A2.

### ***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.

Structural Equation Modeling 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 *Structural Equation Modelling* (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%) - acquired while they were still studying. On the other hand, very few had been self-

employed at that time (10 respondents, 2.5% 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%). 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 fourteen respondents reported having been self-employed after 2004. Nevertheless, this figure represents a substantial increase compared to T1 data (10.4% of the T2 sample).

It is interesting to compare the responses at both moments. Only 3 of the 10 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. Firstly, 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:  $\chi^2 = 6006.85$ ;  $df = 190$ ;  $p < 0.001$ ; cumulative variance explained = 73.1%). 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:  $\chi^2 = 2250.84$ ;  $df = 190$ ;  $p < 0.001$ ; cumulative variance explained = 74.8%) and the T2 response sets. For the T2 sub-sample, however, only three factors had eigenvalues greater than one. In this case, following the theory, a four-factor solution was forced (KMO = 0.923, Bartlett's test:  $\chi^2 = 2806.61$ ;  $df = 190$ ;  $p < 0.001$ ; cumulative variance explained = 80.1%) 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.

Hypothesis H1 was tested by analyzing relative and absolute stabilities. Relative stability was measured using test-retest correlation coefficients. Table 1 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.

*Insert Table 1 around here*

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 postgraduate levels, entrepreneurship initiatives should include 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 ([2013](#)) strongly suggest the use of intention models as a standard and rigorous evaluation instrument.

### ***Stability in the pattern of relationships***

Hypothesis H2 refers to the stability of the TPB over time. Consequently, a Structural Equation Model (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 alpha) and validity (average variance extracted) indicators for the measurement model were found to be satisfactory, as reported in Appendix A3.

*Insert Figure 1 around here*

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% of the variance. In particular, the coefficient between EI<sub>t1</sub> and EI<sub>t2</sub> is relatively low, despite the fact these two constructs have the highest correlation (see Table 1). This should be because EI<sub>t2</sub> is explained by PA<sub>t2</sub> and PBC<sub>t2</sub>, which are themselves explained by PA<sub>t1</sub> and PBC<sub>t1</sub>. 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 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 entrepreneurial intention 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 hypothesis 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 Hypothesis H3 we used the information regarding start-up experience after 2004. Figure 2 summarizes the results of the Structural Equation Model. 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 Appendix A4. Item loadings at each construct were always above 0.7, except for item 13c in SN<sub>t1</sub>, 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.

*Insert Figure 2 around here*

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.

Even though the degree of start-up variance explained by entrepreneurial intention is limited (12.8%), 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, 2002b](#); [1991](#)). The results show, though, that PBC has been the only significant antecedent of intention to change that occurred 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 3-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 fourteen 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.

Thirdly, 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 entrepreneurial intentions. 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. Firstly, it is a long-term longitudinal study. Secondly, it analyzes perceptions and the conditions

required for accurate prediction. Thirdly, 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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## APPENDIX

### A1. Items used to measure 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"/>						
1.b- A career as an entrepreneur is attractive for me	<input type="checkbox"/>						
1.c- If I had the opportunity and resources, I'd like to start a firm	<input type="checkbox"/>						
1.d- Being an entrepreneur would entail great satisfactions for me	<input type="checkbox"/>						
1.e- Among various options, I would rather be an entrepreneur	<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"/>						
2.b- Your friends	<input type="checkbox"/>						
2.c- Your colleagues	<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
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- 3.a- To start a firm and keep it working would be easy for me
- 3.b- I am prepared to start a viable firm
- 3.c- I can control the creation process of a new firm
- 3.d- I know the necessary practical details to start a firm
- 3.e- I know how to develop an entrepreneurial project
- 3.f- If I tried to start a firm, I would have a high probability of succeeding

**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"/> |
| 4.b- My professional goal is to become an entrepreneur     | <input type="checkbox"/> |
| 4.c- I will make every effort to start and run my own firm | <input type="checkbox"/> |
| 4.d- I am determined to create a firm in the future        | <input type="checkbox"/> |
| 4.e- I have very seriously thought of starting a firm      | <input type="checkbox"/> |
| 4.f- I have the firm intention to start a firm some day    | <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 A2. Descriptive statistics and correlations**

	Mean	St.Dv.	Min.	Max.	1	2	3	4	5	6	7	8	9	10	11
<b>1 Gender</b>	0.44	0.50	0	1	1										
<b>2 Lab.Exp.</b>	0.42	0.50	0	1	0.06	1									
<b>3 Role model</b>	0.87	0.34	0	1	-0.05	0.07	1								
<b>4 PA-T1</b>	4.71	1.38	1.20	7	0.24**	0.12	0e.10	1							
<b>5 SN-T1</b>	5.76	1.02	3.00	7	-0.07	0.03	0.09	0.35***	1						
<b>6 PBC-T1</b>	3.73	1.17	1	6.66	0.37***	0.25**	0.09	0.48***	0.25**	1					
<b>7 EntInt-T1</b>	3.66	1.60	1	7	0.22**	0.18*	0.17*	0.79***	0.23**	0.48***	1				
<b>8 PA-T2</b>	4.69	1.33	1.41	7	0.25**	0.14	0.00	0.51***	0.24**	0.24**	0.59***	1			
<b>9 SN-T2</b>	5.68	1.18	1.37	7	0.00	0.10	0.04	0.22*	0.56***	0.21*	0.23**	0.36***	1		
<b>10 PBC-T2</b>	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	
<b>11 EntInt-T2</b>	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
<b>12 StartUp</b>	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***

**Note:** T1 denotes a variable measured at year 2004, while T2 denotes a variable measured at year 2007. PA is the personal attitude toward start-up. SN is the subjective norm. PBC is the Perceived Behavioral Control. EntInt is the entrepreneurial intention. Significance levels: \* p<0.05; \*\* p< 0.01; \*\*\* p<0.001

**Table A3. Reliability and validity indicators (Model 1)**

	T1			T2		
	Loading	AVE	Composite Reliability	Loading	AVE	Composite Reliability
Personal Attitude		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***		
Subjective Norm		0.692	0.869		0.805	0.925
A2a	0.8559***			0.8640***		
A2b	0.9131***			0.9117***		
A2c	0.7132***			0.9158***		
Perceived Behavioral Control		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***		
Entrepreneurial Intention		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***		

**Note:** AVE = Average Variance Extracted. Significance levels: \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ , based on a 500 bootstrapping resampling procedure.

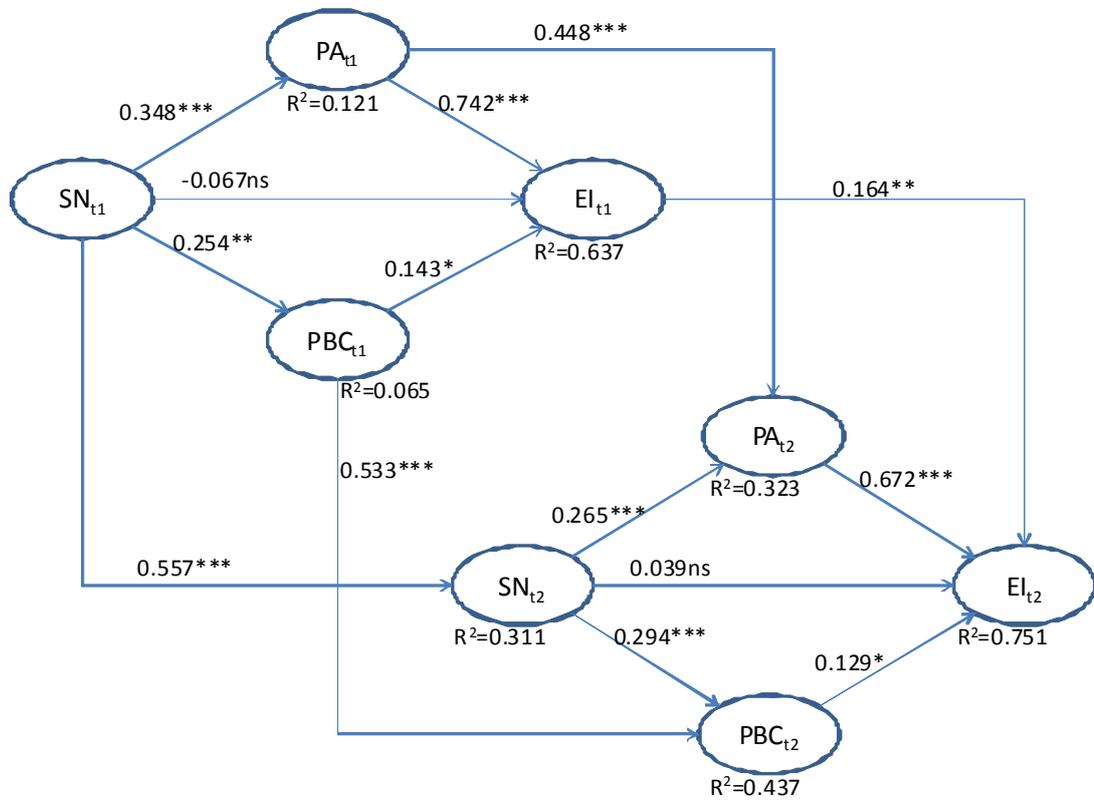
**Table A4. Reliability and validity indicators (Model 2)**

	Loading	AVE	Composite Reliability
Personal Attitude (T1)		0.782	0.947
A1a	0.8377***		
A1b	0.9016***		
A1c	0.8972***		
A1d	0.8878***		
A1e	0.8949***		
Subjective Norm (T1)		0.650	0.846
A2a	0.8691***		
A2b	0.8774***		
A2c	0.6515***		
Perceived Behavioral Control (T1)		0.668	0.923
A3a	0.7706***		
A3b	0.8576***		
A3c	0.9039***		
A3d	0.7160***		
A3e	0.8324***		
A3f	0.8102***		
Entrepreneurial Intention (T1)		0.781	0.955
A4a	0.8285***		
A4b	0.9145***		
A4c	0.9172***		
A4d	0.9195***		
A4e	0.8476***		
A4f	0.8724***		

**Note:** AVE = Average Variance Extracted. Significance levels: \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ , based on a 500 bootstrapping resampling procedure.

**Figure 1**

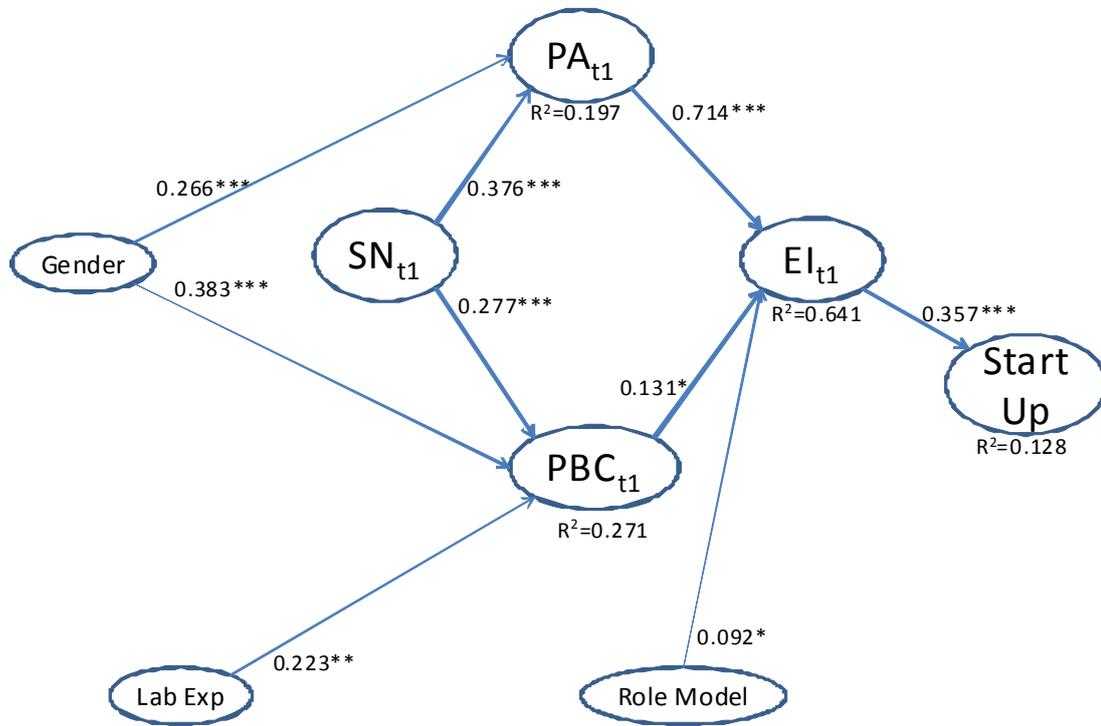
**Entrepreneurial Intention Model over time**



**Note:** Subscript t1 denotes a variable measured at year 2004, while t2 denotes a variable measured at year 2007. R<sup>2</sup> is the coefficient of determination. PA is the personal attitude towards start-up. SN is the subjective norm. PBC is the Perceived Behavioral Control. EI is the entrepreneurial intention. Significance levels: ns = not significant; \* = p < 0.05, \*\* = p < 0.01; \*\*\* = p < 0.001.

**Figure 2**

**Prediction of Start-up behavior from the TPB**



**Note:** Subscript t1 denotes a variable measured at year 2004.  $R^2$  is the coefficient of determination. PA is the personal attitude towards start-up. SN is the subjective norm. PBC is the Perceived Behavioral Control. EI is the entrepreneurial intention. Lab Exp is labor experience. Significance levels: \*=  $p < 0.05$ , \*\* =  $p < 0.01$ ; \*\*\* =  $p < 0.001$ .

**Table 1****Stability of the Theory of Planned Behavior constructs over time**

	T1		T2		Stability	
	Mean	S.D.	Mean	S.D.	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***

**Note:** T1 is the initial wave of the study (2004). T2 is the final wave of the study (2007). S.D.

means Standard Deviation. Significance levels: \*  $p < 0.05$ , \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .