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Psychological characteristics and entrepreneurial intentions among secondary students

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Abstract

Purpose – The purpose of this paper is to test a model of entrepreneurial intentions among secondary students based on their psychological characteristics. Furthermore, this seeks to determine whether teenage students (14-15 years old) possess entrepreneurial characteristics and whether these characteristics correspond to entrepreneurial intentions.

Design/methodology/approach – A sample of secondary students was chosen ranging from 14 to 15 years old. Data were collected through a questionnaire and analysed by univarite statistics and structural equations modelling (PLS) to measure the relationship between the psychological characteristics and entrepreneurial intentions.

Findings – The results demonstrate there is a relationship between (some) psychological characteristics and entrepreneurial intentions. The propensity to risk negatively influences entrepreneurial intentions, meanwhile self-confidence and the need for achievement positively influence the construct. The relationship between tolerance and ambiguity, locus of control and innovativeness with entrepreneurial intentions reported no statistical significance.

Research limitations/implications – The results reinforce the idea that psychological characteristics (trait approach) influence entrepreneurial intentions. However, the model needs further development through the incorporation of behavioural characteristics. This would allow for the understanding of whether behaviour and trait theories oppose or complement each other.

Originality/value – The paper provides important evidence for improving entrepreneurship education for young students. First, it is important to incite and develop some psychological characteristics in order to promote entrepreneurial intentions. Second, entrepreneurship curricula should jointly develop both entrepreneurial characteristics and the awareness among students about the viability of an entrepreneurial career. This may be achieved not only by presenting entrepreneurs as role models, promoting an entrepreneurial culture but also by developing entrepreneurial skills that improve self-confidence.

Keywords Entrepreneurship education, Entrepreneurial intention, Psychological characteristics

Paper type Research paper

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1. Introduction

The educational system is one key area susceptible to interventions presenting entrepreneurship as a viable alternative to dependent employment. The support for this view comes from a wide literature review of enterprise, entrepreneurship and business creation. The evidence suggesting a positive link between education and entrepreneurship is robust (Gorman *et al.*, 1997; Henry *et al.*, 2003; Peterman and Kennedy, 2003; Fayolle *et al.*, 2006; Ferreira *et al.*, 2007; Raposo *et al.*, 2008, Oosterbeek *et al.*, 2010; von Graevenitz *et al.*, 2010). Accordingly to Kuratko (2005, p. 580), "it is becoming clear that entrepreneurship, or certain facets of it, can be taught". More specifically, there is some evidence that entrepreneurship education plays a positive role in student entrepreneurial intentions (Pittaway and Cope, 2007; Nabi *et al.*, 2010). Additionally, Collins and Moore (1964) posit how the entrepreneurial role might be culturally and experimentally acquired, and therefore influenced by education and training.

Some studies advance the idea that early formal entrepreneurship education affects the attitudes of students, influencing them in the direction of their future career and affecting their propensity for entrepreneurship on becoming adults. In this sense, the pedagogical approach should encourage children to make decisions and accept mistakes as part of the learning process. Thus, primary and secondary school has received growing attention in the entrepreneurship education literature, and the impact of enterprise education programmes in secondary school was confirmed as important for later entrepreneurial intentions (Frank *et al.*, 2005). It is generally held that the ideal stage to acquire basic knowledge about entrepreneurship and to foster a positive attitude towards entrepreneurship is during childhood and years of adolescence (Peterman and Kennedy, 2003). This idea is also present in European Union recommendations (see *Action Plan to Promote Entrepreneurship and Competitiveness – BEST Action Plan,* European Commission, 1999 and *Green Paper on Entrepreneurship*, European Commission, 2003), which refers to the promotion of entrepreneurship through the education system from primary school to university as a core goal (Frank *et al.*, 2005).

Knowledge on the student entrepreneurial characteristics most impacting on entrepreneurial intentions (defined here as the intention to start up a business) may represent an important contribution to the development of educational programmes suitable to fostering entrepreneurship and business creation. While there are several studies on university students, few focus on younger students. Since each age group corresponds to different psychological characteristics, it is important to understand the specific needs of each age group concerning the design of entrepreneurship curricula.

The purpose of this research is to study the effects of psychological dimensions on the perception of start-up companies among secondary students. In order to reach this goal, some hypotheses of entrepreneurial intention related to psychological characteristics are tested.

After this introduction, this paper is structured as follow. The next section reviews the literature relating to (psychological) entrepreneurial characteristics and entrepreneurial intentions, presenting research hypotheses and the resulting structural model. The fourth section discusses the research methodology and the fifth section presents the results. In the last two sessions, we discuss our results and present the corresponding conclusions.

2. Relationship between entrepreneurial characteristics and entrepreneurial (start-up business) intentions: hypotheses and model derivation

This study adopts the psychological approach to entrepreneurship. This approach focused on personality/psychological factors and characteristics is usually described

as the trait approach to entrepreneurship (McClelland, 1961; Brockhaus, 1980). This line of research represents one of the earliest and more extensive researches on the factors that influence the decision to start up a business In spite of the fact that some criticise this approach and its predictive power (e.g Gartner, 1989), individual traits or personality characteristics remain one of the factors attracting the greatest research attentions (Robinson *et al.*, 1991; Ho and Koh, 1992; Koh, 1996; Bakotic and Kruzic, 2010). For example, Mitton (1989) describes entrepreneurs as those displaying certain psychological characteristics such as a commitment to their work, a need for total control and an ability to cope with uncertainty and challenges.

Similar to social psychology authors (Ajzen, 1991), in this paper we assume that intention is a significant predictor of behaviour. Ajzen (1991) provides a generic definition of intention as "a person's readiness to perform a given behaviour". In the entrepreneurial context, Thompson (2009, p. 676) defines intention as the "self-acknowledged conviction by a person that they intend to set up a new business venture and consciously plan to do so at some point in the future".

Concerning the psychological characteristics associated with entrepreneurial intention, Bygrave (1989) puts forward a model that includes: need for achievement, internal locus of control, tolerance for ambiguity and propensity to risk taking. Robinson *et al.* (1991), in turn, propose how achievement, innovativeness, control and self-confidence might be good predictors of entrepreneurial attitude. In general, the main psychological characteristics associated with entrepreneurship focused on the literature are: locus of control, propensity to take risks, self-confidence, need for achievement, tolerance to ambiguity and innovativeness.

Locus of control

The locus of control represents the degree to which individuals believe that their achievements are dependent on their own behaviour. Individuals corresponding consider that the accomplishment of goals or objectives depends more on their own ability and actions, rather than luck or other people's efforts (Kuip and Verheul, 2003). The empirical evidence does report how small businesses entrepreneurs are more oriented at the internal level than the population in general (De Vries, 1977; Begley and Boyd, 1987; Beverland and Lockshin, 2001). The longitudinal study by Brockhaus (1980) suggests the existence of a positive correlation between orientation to locus of control and entrepreneurial success. In another study, Brockhaus and Horwitz (1986) reinforce how the locus of control might differentiate entrepreneurs who are successful from those who are unsuccessful. Robinson *et al.* (1991) state that internal control leads to a positive entrepreneurial attitude and most students who receive entrepreneurial formation may develop a higher level of control and self-efficiency. Given the above, the first hypothesis tested in this study is:

H1. Locus of control positively influences Entrepreneurial Intentions [LC $\rightarrow^{+}$ EI].

Propensity to take risk

This variable refers to acceptation of risk when engaging in an activity and hence related to the probability of success of any activity being less than 100 per cent (Kuip and Verheul, 2003). Even if the risk-taking propensity is often mentioned as a determinant of entrepreneurial intentions (e.g. Bygrave, 1989), several empirical studies suggest that small business entrepreneurs do not have positive attitudes towards risk and do not consider themselves as risk takers (Davidsson, 1989; Baron, 1998), nor do they seem to

differ from other groups in more objective tests on risk taking (Brockhaus, 1980). According to McClelland (1961) and Bellu (1988), entrepreneurs seem slightly less attracted to taking risks in situations known as pure shift games. Entrepreneur risk taking may be specific or momentary (Beverland and Lockshin, 2001). Davidsson (1989) asserts that where the aspirations are sufficiently accomplished, the entrepreneurs may simply stop taking higher risks. However, risk taking and the acceptance of uncertainty is something that can slowly be modified when desired (Carayannis *et al.*, 2003). Thus, it is still not clear in the literature whether there actually is a relationship between the propensity to risk-taking and entrepreneurial intention in the nature of either such relationship. In order to clarify this aspect, the second hypothesis states:

H2. The propensity to take risk influences Entrepreneurial Intentions [PR → EI].

Self-confidence

A high level of self-confidence has been suggested by many studies as an entrepreneur's standard characteristic. In reality, this characteristic emerges constantly in a compilation of empirical studies as stated by Davidsson (1989). Ho and Koh (1992) refer to self-confidence as an entrepreneurial characteristic and how it is related to other psychological characteristics, such as locus of control, propensity to take risk and tolerance to ambiguity. Robinson *et al.* (1991) have found entrepreneurs report higher degrees of self-confidence relative to non-entrepreneurs. Therefore, another hypothesis was formulated:

H3. Self-confidence positively influences Entrepreneurial Intentions [SC → $^{+}$EI].

Need for achievement

McClelland (1961) introduces rather revealing empirical evidence (obtained through several kinds of methods) on the existence of a connection between the need for achievement and (business) development. Other authors find some sustenance in the relationship between the need for achievement and entrepreneurial behaviour (e.g. Davidsson, 1989), and consider this need to achievement represents a crucial factor (Begley and Boyd, 1987; Bellu, 1988; Beverland and Lockshin, 2001). However, Davidsson and Wiklund (1999) state that the need for achievement is not an important cause of entrepreneurial behaviour. According to these authors, the concept of need for achievement suffers from a lack of clarity in its definition, as well as measuring problems. To Davidsson (1989), the basic idea that individuals and cultures differ regarding the value attached to achievements (economic) and that these differences affect the efforts of entrepreneurs is still not very plausible. Fostering attitudes towards high achievement in students reaching beyond the external motivation over high grades is one of the most difficult challenges in business education (Florin *et al.*, 2007). Based on previous research that found that entrepreneurs are high achievers, this study postulates the following hypothesis:

H4. Need for Achievement positively influences Entrepreneurial Intentions [NA → $^{+}$EI].

Tolerance to ambiguity

According to Koh (1996, p. 15) "when there is insufficient information to structure a situation, an ambiguous situation is said to exist". The ways in which individuals perceive ambiguous situations and organise the information reflect their tolerance to

ambiguity. Should individuals hold high ambiguity tolerance levels, they may be said to consider ambiguous situations challenging and strive to overcome unpredictable situations in order to perform well. Mitton (1989) states that entrepreneurs do not only operate in uncertain environments, but they do also eagerly undertake the unknown and actively manage uncertainty. Hence, tolerance to ambiguity may be considered an entrepreneurial characteristic and those who are more entrepreneurial are expected to correspondingly display more tolerance to ambiguity than others. Therefore, our fifth hypothesis is as follows:

H5. Tolerance to Ambiguity positively influences Entrepreneurial Intentions [TA $\rightarrow {}^{+}$ EI].

Innovativeness

According to Robinson *et al.* (1991), innovativeness is related to perceiving and acting on business activities in new and unique ways. This idea is one of the recurring themes in defining entrepreneurship. For example, according to Schumpeter (1934), innovativeness is the most fundamental aspect of entrepreneurship and an essential entrepreneurial characteristic. Evidence from a review of the literature reveals how entrepreneurs are significantly more innovative than non-entrepreneurs (Robinson *et al.*, 1991). Given the above, the last formulated hypothesis in this study is:

H6. Innovativeness positively influences Entrepreneurial Intentions [IN $\rightarrow {}^{+}$ EI].

Hence, presenting and testing a model based on these assumptions (research *H1-H6*) does seem feasible. The Entrepreneurial Intention model used in this study includes several constructs related to the psychological characteristics mentioned above: locus of control, propensity to take risk, self-confidence, need for achievement, tolerance to ambiguity and innovativeness (Figure 1). Each of the constructs was depicted by means of several items used in a questionnaire survey, as is indeed explained in the following section.

3. Methodology

This empirical research is based on a sample of 74 secondary students aged between 14 and 15 years old (average age 14.3 years old) of which 47.3 per cent are female. Data collection was undertaken through a self-administered in class survey questionnaire. This questionnaire was structured according to both the questionnaires conceived by Liñán and Chen (2007) to assess entrepreneurial intentions, and by Koh (1996) for studying entrepreneurial characteristics. This thereby includes several groups of questions (each group including five to seven items) that operationalise the variables concerning start-up (entrepreneurial) intentions (Liñán and Chen, 2007) and psychological characteristics (Koh, 1996). All these questions were formulated as sentences answered on a five-point Likert-scale, with 1 – "completely disagree" and 5 – "completely agree".

The questions concerning each variable were interspersed throughout the questionnaire in order to avoid bias in responses. The questionnaire also included some questions concerning demographic characteristics (age and gender) to better characterise the sample. The appendix contains a table with the variables and respective questions included in the questionnaire. None of the questionnaires received presented any missing values.

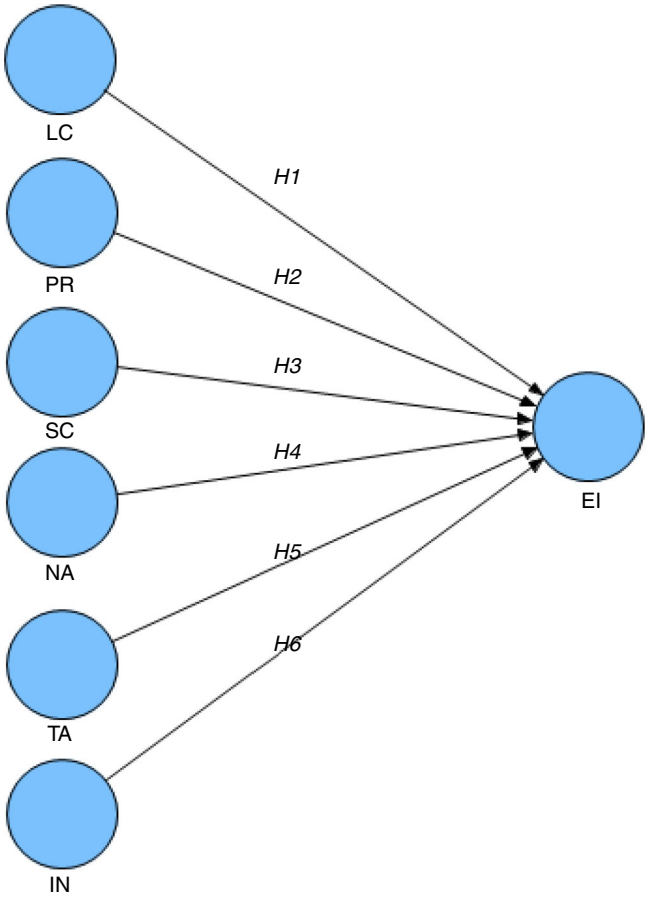

Figure 1.
Entrepreneurial intention model

Data were statistically analysed (descriptive analysis and *t*-tests) through applying the IBM SPSS 19 statistical software. The partial least squares (PLS) technique was also deployed to test the model through recourse to Smart PLS software (Ringle *et al.*, 2005). This method consists of a statistical modelling-based technique through structural equations enabling the simultaneous estimation of a group of equations by measuring the concepts (measurement model) and the relationships between them (structural model) and endowed with the capacity to address concepts not otherwise directly observable.

The PLS procedure is used to estimate the latent variables as an exact linear combination of their indicators with the goal of maximising the explained variance for the indicators and constructs. Following a series of analyses, PLS optimally weighs the indicators so that a resulting latent variable estimate is obtained. Rather than assuming equal weightings for all scale indicators, the PLS algorithm allows each indicator to vary in terms of its contribution to the composite construct score (Chin *et al.*, 1996).

According to Nunnally (1978), reliability and validity are also essential psychometrics to be reported. To access discriminant validity, correlations among

indicators and constructs were deployed. Constructs prove robust when each represented item reports a higher correlation with their own construct than with any other and signifying that they are perceived by respondents as fitting in with that theoretical construct (Messick, 1988; Hair *et al.*, 2011). Reliability was assessed using Cronbach's α (Cronbach, 1951) and the composite reliability of the proposed scales. The estimates of the structural paths commonly tend to be more accurate as the reliability of the estimated construct score (composite reliability) increases. The usual threshold level is 0.7 for newly developed measures (Nunnally, 1978).

To test the significance of each weight in the structural model, we applied the bootstrapping technique, which consists of generating a large number of sub-samples from the original sample through the systematic deletion of observations. The model is recomputed for each sub-sample, and the resulting weightings are averaged. The resulting mean of weights is compared with the original weight. Table I sets out the main methodological aspects related to this research.

4. Results

Descriptive analysis

Summated scales for each construct were established by computing the respective indicator means for each respondent. The descriptive statistics of the summated scales, as well as the results of the one-sample t-test, are presented in Table II.

It should be noticed that Entrepreneurial Intention (EI) has the lowest mean of the seven scales, but also the largest standard deviation, meaning that the group is very heterogeneous regarding EI. This scale also presents the highest maximum value of 4.5 (along with Need for Achievement (NA)), and the largest range (3.33) alongside Tolerance to Ambiguity (TA). Innovativeness (IN) has the highest mean value. However, as shown later, this construct is not related to Entrepreneurial Intention in this specific sample.

Results also indicate that students in general neither have entrepreneurial intentions (EI) nor are particularly prone to risk (PR), since the scales concerning these constructs

Time basis	Cross-section
Sampling unit	Secondary students
Sample	74 individuals
Response rate	100%
Research method	Self-administered questionnaire
Statistical analysis	Bivariate, multivariate – PLS

Table I. Synthesis of methodological aspects

	Minimum	Maximum	Mean	SD	t^a	Significance
Entrepreneurial Intention (EI)	1.17	*4.50*	*2.824*	*0.614*	−2.462	0.016
Locus of Control (LC)	2.00	4.29	3.390	0.445	7.537	0.000
Propensity to Take Risk (PR)	1.33	4.33	2.829	0.517	−2.849	0.006
Self-Confidence (SC)	1.67	4.33	2.957	0.449	−0.820	*0.415*
Need for Achievement (NA)	1.17	*4.50*	3.358	0.467	6.607	0.000
Tolerance to Ambiguity (TA)	1.00	4.00	3.252	0.450	4.821	0.000
Innovativeness (IN)	1.20	4.40	*3.546*	0.415	11.312	0.000

Note: [a]*t*-test with 73 degrees of freedom and test value 3 (neither agree nor disagree)

Table II. Descriptives of summated scales and *t*-tests

are below 3[1]. Regarding Self-Confidence (SC), in spite of the fact that the mean value is under 3, the *t*-test indicates that the difference is not statistically significant.

The Innovativeness (IN); Locus of Control (LC), Need for Achievement (NA) and Tolerance to Ambiguity (TA) scales present statistically significant scores and higher than 3, which represent the presence of positive values for these group items.

PLS modelling

The cross-loading results (the correlations between indictors and constructs) for the initial model indicate that some indicators presented high cross-loadings. The measurement model was purified of these indicators. In Table III the purified measurement model cross-loadings are presented. The results render the discriminant validity of the purified measurement model more evident.

Table IV sets out the reliability measures. According to these results, Need for Achievement (NA), but especially, Tolerance to Ambiguity (TA), Innovativeness (IN) and Self-Confidence (SC) constructs report reliability problems. Therefore, reliability analysis is again performed after analysing the structural model.

Using the bootstrapping technique, 1,000 valid sub-samples were extracted. The initial model results are shown in Table V.

	EI	IN	LC	NA	PR	SC	TA
EI1	*0.617*	0.257	0.199	0.366	0.084	0.373	0.081
EI2	*0.558*	0.232	0.162	0.282	0.088	0.193	0.036
EI3	*0.586*	0.313	0.389	0.331	0.285	0.243	0.176
EI4	*0.594*	0.272	0.303	0.277	0.158	0.239	0.146
EI5	*0.537*	0.041	0.000	0.014	0.115	0.128	0.072
EI6	*0.721*	0.117	0.359	0.342	0.310	0.191	0.247
IN2	0.268	*0.707*	0.333	0.399	0.057	0.273	0.210
IN5	0.140	*0.435*	0.277	0.348	0.204	0.074	0.194
LC1	0.190	0.028	*0.450*	0.295	0.096	0.084	0.117
LC2	0.136	0.307	*0.362*	0.292	0.030	0.080	0.032
LC3	0.320	0.047	*0.557*	0.285	0.167	0.002	0.103
LC4	0.179	0.368	*0.519*	0.373	0.163	0.124	0.240
LC5	0.181	0.470	*0.555*	0.490	0.304	0.201	0.336
LC6	0.339	0.506	*0.729*	0.485	0.502	0.265	0.256
NA1	0.323	0.231	0.295	*0.423*	0.105	0.021	0.195
NA2	0.332	0.259	0.356	*0.634*	0.189	0.221	0.151
NA3	0.091	0.215	0.167	*0.248*	0.016	0.150	0.065
NA5	0.138	0.434	0.368	*0.520*	0.252	0.177	0.336
NA6	0.197	0.549	0.491	*0.600*	0.269	0.104	0.174
PR1	0.173	0.173	0.385	0.326	*0.543*	0.088	0.087
PR2	0.119	0.048	0.246	0.098	*0.631*	0.125	0.245
PR3	0.284	0.167	0.277	0.231	*0.843*	0.112	0.015
SC3	0.271	0.161	0.239	0.209	0.071	*0.801*	0.323
SC4	0.084	0.069	0.072	0.042	0.140	*0.328*	0.060
SC5	0.293	0.379	0.174	0.206	0.064	*0.632*	0.260
TA1	0.166	0.138	0.031	0.090	0.013	0.100	*0.605*
TA2	0.138	0.307	0.387	0.349	0.054	0.299	*0.665*
TA5	0.101	0.172	0.237	0.167	0.018	0.269	*0.544*
TA6	0.079	0.053	0.159	0.085	0.230	0.024	*0.320*

Table III.
Cross-loadings

The paths IN → EI, LC → EI and TA → EI were considered non-significant ($\alpha = 0.05$) and subsequently excluded from the original model. After these exclusions, the remaining paths were considered significant ($\alpha = 0.05$), as shown in Table VI.

According to Chin (1998), relationships between constructs with structural coefficients > 0.2 should be considered robust. We should also note that the total effect of an independent variable over a dependent variable is greater than its direct effect, because of the indirect effects (Raposo *et al.*, 2008). In this model, however, there are no indirect effects and so total effects are the same as direct effects (Table VII). All these effects (in absolute value) are close to or above the threshold value of 0.2. Need for Achievement (NA) has the most important effect on Entrepreneurial Intention (EI) (0.356). It is also interesting to observe that Propensity to take Risk (PR) has a negative effect on Entrepreneurial Intention (EI).

Construct	Composite reliability	Cronbach's α
EI	0.77	0.79
LC	0.70	0.65
PR	0.72	0.58
SC	*0.51*	*0.39*
NA	*0.61*	0.56
TA	*0.47*	*0.31*
IN	*0.50*	*0.47*

Table IV. Reliability measures

	Original sample	Sample mean	SD	SE	*t*	Significance
IN → EI	−0.012	−0.015	0.113	0.113	0.108	*0.915*
LC → EI	0.110	0.120	0.144	0.144	0.770	*0.444*
NA → EI	0.304	0.330	0.125	0.125	2.427	0.018
PR → EI	−0.174	−0.164	0.087	0.087	1.995	0.050
SC → EI	0.285	0.272	0.076	0.076	3.733	0.000
TA → EI	−0.015	0.043	0.118	0.118	0.126	*0.900*

Table V. Initial bootstrap results

	Original sample	Sample mean	SD	SE	*t*	Significance
NA → EI	0.356	0.388	0.081	0.081	4.376	0.000
PR → EI	−0.197	−0.192	0.078	0.078	2.535	0.013
SC → EI	0.290	0.294	0.069	0.069	4.180	0.000

Table VI. Final bootstrap results

	EI
NA	0.356
PR	−0.196
SC	0.290

Table VII. Direct/total effects

Model evaluation is only complete after assessment of its explanatory capacity reported by the proportion of the total endogenous variable variance explained by the model, the R^2-statistic (Table VIII). This model explains 35.0 per cent of the variance in Entrepreneurial Intention (EI) based on Need for Achievement (NA), Propensity to take risks (PR) and Self-Confidence (SC). According to Liñán and Chen (2007), this result is convergent with most previous research using linear models in which models typically explain less than 40 per cent. The exclusion of three original constructs (Innovativeness, Locus of Control and Tolerance to Ambiguity) contributes to this low value. Some constructs in the final model return poor levels of reliability, especially NA and SC, with composite reliability results of slightly over 0.6.

The significance of structural coefficients and the magnitude of direct effects provide for testing the research hypotheses. The results are as follows:

H1: [LC → + EI] – not supported;

H2: [PR → EI] – supported, with a negative relationship;

H3: [SC → + EI] – supported;

H4: [NA → + EI] – supported;

H5: [TA → + EI] – not supported; and

H6: [IN → + EI] – not supported

Figure 2 presents the final model, with the direct effects and explained variances in the endogenous construct. Three paths were excluded from the initial model (Figure 1).

5. Discussion

In general, students are not prone to risk taking while returning high scores for innovativeness, and a positive level of locus of control, need for achievement and tolerance to ambiguity.

The group of students subject to analysis is very heterogeneous as regards entrepreneurial intention, but the mean group score for this construct indicates a low level of intention to start up a business.

These results may stem from diverse circumstances:

(1) Students do not evaluate entrepreneurship positively (they do not consider "being an entrepreneur" an interesting career).

(2) Students do not feel able to become entrepreneurs. In fact, this explanation fits both with the low levels of group self-confidence[2] and the positive relationship between self-confidence and entrepreneurial intentions.

	Composite reliability	R^2	Cronbach's α
EI	0.78	0.35	0.79
NA	0.61	–	0.56
PR	0.72	–	0.58
SC	0.63	–	0.43

Table VIII.
Explained variance and reliability

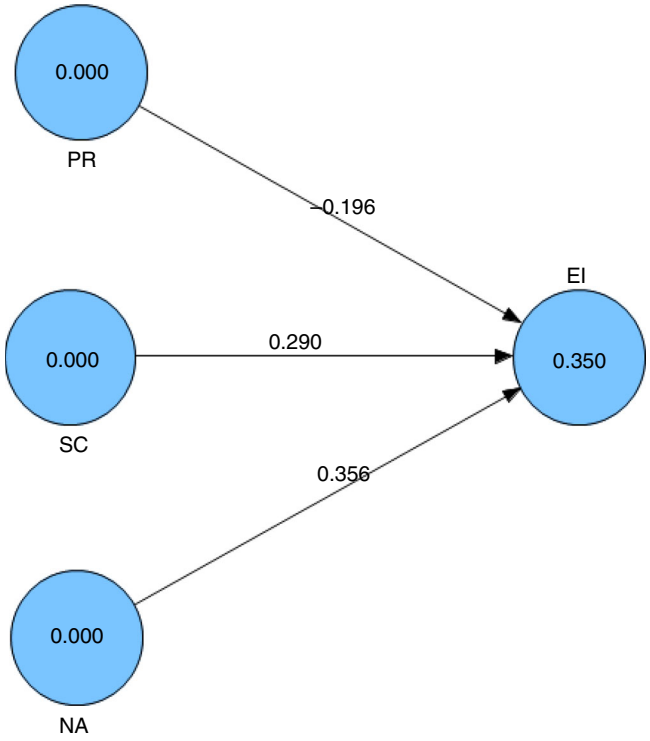

Figure 2.
Final structural model

These two possible explanations make it clear that in order to increase the level of entrepreneurial intentions, efforts have to focus on two different directions: first, making entrepreneurship a career interesting to young students, for instance, by presenting businessmen as role models, emphasising the benefits of entrepreneurship, developing an entrepreneurship favourable culture and, second, developing entrepreneurial capabilities and self-confidence. Concerning this latter aspect, considering that self-confidence is closely related with self-esteem, it is important to note that special efforts are required to reinforce this facet throughout the schooling period, since, as mentioned by Scott *et al.* (1996), as student get older, their self-esteem diminishes.

These findings also align with the conclusions by Bakotic and Kruzic (2010): according to these authors, entrepreneurship educational programs contribute to increasing the perception of aspects important to entrepreneurship, as well as creating a realistic vision of entrepreneurship problems. Thus, the authors advocate the need for permanent student education, which should be focused on the additional development of their competences and the skills needed later in a market context.

Concerning the relationship between psychological characteristics and entrepreneurial intentions, our results indicate that a relationship does exist. More specifically, they show that.

Propensity to take risk negatively influences entrepreneurial intentions

This result converges with conclusions by several authors that find entrepreneurs frequently do not display positive attitudes towards risk and they neither consider

themselves personally as risk takers (e.g. Davidsson, 1989; Baron, 1998; McClelland, 1961; Bellu, 1988), nor do they seem to differ from other groups in more objective risk taking tests (Brockhaus, 1980). In the particular case of this study, there are also several other explanations for this result. One derives from the lack of real student knowledge about what it takes to be an entrepreneur while also lacking any perception of the risks involved and assuming constant success. On the other hand, according to Beverland and Lockshin (2001), entrepreneurial risk taking may be specific or momentary. Since this research is based on "what if" questions, the perception of risk may be considerably lower. This does not mean that in real situations, some individuals would not consider higher levels of risk. If so, these results highlight the need to promote the acceptance of uncertainty and the level of risk taking among students as they improve their understanding/knowledge of the business world. This, according to Davidsson (1989), is something susceptible to slow modification.

Self-confidence and the need for achievement positively influence entrepreneurial intentions

These results are in keeping with previous earlier works. In fact, a high level of self-confidence has been suggested by many studies (e.g Davidsson, 1989; Robinson *et al.*, 1991) as an entrepreneur's standard characteristic. Additionally, the need for achievement is identified by many studies as a factor crucial to entrepreneurship (Begley and Boyd, 1987; Bellu, 1988; Beverland and Lockshin, 2001). In the view of these results, we agree with Florin *et al.* (2007) who maintain that promoting an attitude towards high student achievement reaching beyond the external high grade motivation, in conjunction with developing the self-confidence that enables action, are among the most important but also difficult challenges facing the field of entrepreneurship education.

The relationship between entrepreneurial intentions and tolerance to ambiguity, locus of control and innovativeness did not present statistical significance

Many authors consider tolerance to ambiguity as an entrepreneurial characteristic (e.g. Mitton, 1989; Koh, 1996) and that those who are more entrepreneurial are expected to display more tolerance to ambiguity than others. In addition, many studies suggest the existence of a positive correlation between orientation to locus of control and entrepreneurship (De Vries, 1977; Begley and Boyd, 1987; Beverland and Lockshin, 2001; Brockhaus, 1980; Brockhaus and Horwitz, 1986; Robinson *et al.*, 1991). Similarly, evidence from the literature review posits how entrepreneurs are significantly more innovative than non-entrepreneurs (Robinson *et al.*, 1991). Our results, however, do not confirm these relationships and despite the fact that the students under analysis present a high degree of tolerance to ambiguity, locus of control and innovativeness. Nevertheless, these characteristics may be associated with the respondent age range and not necessarily with an entrepreneurial orientation directed at starting businesses[3]. For instance, even if students present innovativeness, this characteristic may not be related to perceiving and acting on business activities in new and unique ways. In fact, the younger the students are, the more innovativeness they may display, as they are not yet conditioned by institutionalised frameworks of thought. These are issues for further research.

6. Conclusions

The purpose of this paper involved understanding whether teenage students possess entrepreneurial characteristics and whether these characteristics relate to entrepreneurial intentions. Our results indicate that teenagers possess high levels

of entrepreneurial characteristics, such as innovativeness, locus of control, need for achievement and tolerance to ambiguity, but that these are not related with any intention to start up businesses. Previous studies indicate that these characteristics are important features of entrepreneurs and should be incorporated into entrepreneurship education (Neck and Greene, 2011; Jusoh *et al.*, 2011). Given this, the challenge to educators at this stage is to preserve, or increase, these psychological characteristics while simultaneously making students more self-confident, more aware about, and more interested in an entrepreneurial career. In other words, developing the motivation to become an entrepreneur (including content-specific motivational characteristics such as locus of control and self-efficacy beliefs) would seem a key aspect to developing entrepreneurial curricula, since, as mentioned by Somuncuoglu and Yildirim (1999), motivation represents a driving force for student learning goals.

In interpreting the results of the study, we can point out some limitations concerning methodological aspects. First, the study employs a self-report questionnaire, which brings a chance of response bias. Second, the sample only includes students from one school. Additionally, the sample size is low. These two factors advise some precautions in generalising our results. Furthermore, we should also note that some of the scales applied registered problems with reliability and for this reason, they should be retested in future studies. Discriminant validity was not obvious in all the indicators, with some of them presenting high cross-loadings in other constructs. Should reliability and validity be increased, the excluded constructs might then be retained in the model and thus increasing the level of explained variance (R^2), which, in spite of being similar to other studies, is not completely satisfactory.

There are also some limitations associated with the explicative entrepreneurial intention variables. In fact, several authors in the behavioural line of research (e.g. Gartner, 1989) maintain that behavioural characteristics are more important than psychological characteristics, since entrepreneurship is more related with actions resulting from behaviours, and behaviours are easier to change than personalities. Other authors consider, however, that there is, in fact, a relationship not only between behaviours and entrepreneurship but also between psychological characteristics and behaviours. This relationship is not considered in this work.

Given the above, some possible directions for future research may be highlighted. Considering the methodological aspects, this study must be replicated to include more schools and more students in order to ensure a more reliable generalisation of the results. Future research must also consider the other methodological limitations mentioned above in order to improve result reliability and validity.

Regarding the content aspects, the model should be developed through the incorporation of other variable types, specifically those related with behavioural characteristics. This will provide for the study of the relationship between psychological characteristics, behavioural characteristics and entrepreneurship intentions. The research framework might also be expanded to include other factors such as family, demographic variables and support from the surrounding environment.

Notes

1. As the scales applied to measure the relevant phenomena were Likert scales (minimum 1, maximum 5), three (the median point of the scale) represents the indifference value. Values below three represent negative values on the scale, and those above three are positive values.
2. In spite of the fact that the mean value concerning this construct is not statistically significant when lower than 3.

3. Note that questions about "Entrepreneurial Intentions" refer exclusively to the intention of setting up businesses in the future.

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Appendix

Constructs	Questions/variables
Entrepreneurial Intentions (EI)	(EI1) I am ready to do anything to be an entrepreneur
	(EI2) My professional goal is to become an entrepreneur
	(EI3) I will make every effort to start and run my own firm
	(EI4) I am determined to create a firm in the future
	(EI5) I have very seriously thought about starting a firm
	(EI6) I have the firm intention to start a firm some day
Locus of Control (LC)	(LC1) People's misfortunes result from the mistakes they make
	(LC2) Many of the unhappy things in people's lives are partly due to bad luck
	(LC3) I do not enjoy outcomes, no matter how favourable, if they do not stem from my own efforts
	(LC4) I am willing to accept both positive and negative consequences of my decisions and actions
	(LC5) It is I, not luck nor fate, which influence the outcome of events in my life
	(LC6) I cannot wait and watch things happen; I prefer to make things happen
	(LC7) I believe success is a product of luck and fate rather than personal effort
Propensity to Take Risk (PR)	(PR1) I do not care if the profit is small so long as it is assured and constant(R)
	(PR2) I am willing to take high risks for high returns
	(PR3) I do not mind working under conditions of uncertainty as long as there is a reasonable probability of gains from it for me
	(PR4) I do not fear investing my money on a venture whose dividends I have calculated
	(PR5) I will consider a risk worth taking only if the probability for success is 60% or more(R)
	(PR6) I fear moving into a new undertaking I know nothing about.
Self-Confidence (SC)	(SC1) I accomplish most when I am alone, under no direct supervision of anyone
	(SC2) I have confidence in my ability to achieve
	(SC3) I have weaknesses and fears that are far from being resolved(R)
	(SC4) I doubt my ability to cope under new, untested conditions(R)
	(SC5) I find difficulty in asserting myself against the opinion of majority
	(SC6) Even if I am capable, hardworking and ambitious, if I do not have the money, I cannot start a business(R)
Need for Achievement (NC)	(NA1) I take pleasure in responding to challenges, so competition makes me work harder
	(NA2) I do not like a well-paid job if I cannot derive a sense of achievement and satisfaction from it
	(NA3) I want to earn only as much as possible to attain a comfortable standard of living(R)
	(NA4) I do not mind routine, unchallenging work if the pay is good(R)
	(NA5) When I do something, I see to it that it does not only get done but is done with excellence
	(NA6) I hire people on the basis of friendship and other relations (for their loyalty) rather than on the basis of competence
Tolerance to Ambiguity (TA)	(TA1) Job security is extremely important to me(R)
	(TA2) A good job is one with clear instructions as to what is to be done and how it is to be done(R)
	(TA3) I enjoy working in unstructured situations

(*continued*)

Table AI.
Constructs, variables and questions

Constructs	Questions/variables
Innovativeness (IN)	(TA4) I have a work schedule, which I try to follow very carefully(R) (TA5) It bothers me when several people have over-lapping responsibilities(R) (TA6) In unclear situations, I like to make decisions and take the "lead" (IN1) I avoid changing the way things are done(R) (IN2) While others see nothing unusual in the surroundings, I am able to perceive opportunities for business (IN3) I am able to get around difficulties through strokes of ingenuity and resourcefulness (IN4) I believe there are always new and better ways of doing things (IN5) I find it difficult to come up with new, wild or even crazy ideas(R)

Table AI.

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