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The impact of higher education on entrepreneurial intention and human capital

Impact
of higher
education on
EI and HC

135

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Abstract

Purpose – The purpose of this paper is to investigate the impact of higher education on the emergence of entrepreneurial intention (EI) and human capital (HC) as a component of intellectual capital (IC) that strongly influences the entrepreneurial process.

Design/methodology/approach – On the basis of a literature review, a theoretical model that is focused on the theory of planned behaviour was defined to verify the impact of higher education on the development of EI and HC. To this end, the structural equation modelling methodology was applied to two samples of students and academics, which differ each other in terms of both education level and specific characteristics of entrepreneurship education activities.

Findings – The main results show that there are significant differences between the two considered samples. In particular, the level and specific characteristics of entrepreneurial education are the key factors for the development of EI and HC.

Practical implications – The research may be of relevance for universities and policy makers. Universities must devote more attention to training and practice-oriented entrepreneurial courses and collateral activities (projects, initiatives, actions), both for students (first mission) and academic aspiring entrepreneurs (third mission) to encourage the emergence of EI and HC formation. For policy makers, this study suggests the need to define policy guidelines and frameworks to support universities' educational programmes and activities to strengthen the entrepreneurial process, so that they can be consistent with the EU and national entrepreneurship policies.

Originality/value – This explorative research intends to contribute to the scientific debate by filling the knowledge gap that is due to the very limited number of studies that analyse whether and how EI can mediate the relationship between higher education and HC as an IC component.

Keywords Intellectual capital, Entrepreneurship education, Theory of planned behaviour, Entrepreneurial university, Third mission

Paper type Research paper

Introduction

Over the last three decades, the intangible assets that are recognised as intellectual capital (hereafter IC) have awakened an increasing interest among a range of researchers as a fundamental driver of national economic growth and business development (e.g. Chen *et al.*, 2005; Zéghal and Maaloul, 2010; Buenechea-Elberdin, 2017). These scholars underscore that firms' competitiveness and their future perspectives tend to increasingly depend on IC assets, which, in turn, affect both ventures' capacity to advance high-tech and/or knowledge-based activities and the possibility to acquire, cultivate and share new knowledge (e.g. Sáenz *et al.*, 2009; Maditinos *et al.*, 2011; Bianchi Martini *et al.*, 2016).

The higher education that is provided by universities and research centres plays a significant role in the development and reinforcement of individual and firm IC (Secundo *et al.*, 2010; Volery *et al.*, 2013; Bae *et al.*, 2014). The university system has conventionally sustained the industrial system by filling the gap in intangible resources (Galloway and Brown, 2002;



Lockett and Wright, 2005; Rae, 2010) and by promoting technology transfer and cross-fertilisation processes (Centobelli *et al.*, 2016; Markman *et al.*, 2005; Gunasekara, 2006; Rodrigues *et al.*, 2010).

More recently, universities are expected to support the entrepreneurship choice through multiple initiatives that are designed to spread scientific and entrepreneurial culture to support the creation of start-ups as part of the so-called third mission (Laredo 2007; Franzoni and Lissoni, 2009; Fini *et al.*, 2011).

In particular, high entrepreneurship education (henceforth EE) is meant to provide the requisite learning initiatives (e.g. courses, training, workshops, and business plan competition (BPC)) and the specific skills and knowledge that are needed for individuals to successfully face managerial and financial troubles (Kolvereid and Moen, 1997; Fayolle and Gailly, 2015). Thanks to these initiatives, EE encourages individuals by providing “the right conditions and opportunity, to come out of the woodwork” (Thompson, 2004, p. 243), thus leveraging on the entrepreneurial intention (henceforth EI).

EI is among the most studied antecedents of venture creation (Krueger and Carsrud, 1993; Kolvereid and Isaksen, 2005; Liñán and Chen, 2009; Liñán *et al.*, 2011). One of the widespread models to analyse EI is Ajzen's (1991) theory of planned behaviour (henceforth TPB).

Specifically, by assuming the common breakdown of IC into human, relational and organisational capital (e.g. Kaufmann and Schneider, 2004), several scholars claim that EE chiefly affects the specific and composite IC component that concerns the accumulation of personal attributes such as entrepreneurial knowledge, abilities and skills. Such a set of personal attributes, specifically entrepreneurship-related human capital (henceforth ErHC) (Pittaway and Cope, 2007; Martin *et al.*, 2013), allows individuals to successfully discover, identify, exploit and manage entrepreneurial opportunities (Politis, 2005; Davidsson, 2015). In this view, and in line with Peña's (2002) seminal article in this journal, we assume that ErHC plays a critical role in the early stages of an ideal entrepreneurial process (Reynolds and White, 1997; Hisrich *et al.*, 2005), which is characterised by the initial formation of EI.

Given the fast diffusion of specific EE programmes worldwide, several scholars have long considered the impact of EE on EI (e.g. Souitaris *et al.*, 2007; Liñán *et al.*, 2013), as well as of EE on human capital (henceforth HC) (e.g. Von Graevenitz *et al.*, 2010; Volery *et al.*, 2013) to valorise the efforts of universities as well as to support the outcomes of entrepreneurial policies. The direct and strong relationship among the impacts of EE on EI and HC has not yet been unquestionably demonstrated due to the presence of conflicting results that have been underscored in the literature (e.g. Davidsson and Honig, 2003; Souitaris *et al.*, 2007; Volery *et al.*, 2013; Fayolle and Gailly, 2015; Secundo, Perez, Martinaitis and Leitner, 2017).

With reference to the increasing importance that is gained by ErHC in the early stage of the entrepreneurial process, to the best of our knowledge, only a few studies have specifically analysed the relationship between EE and ErHC as well as between EI and ErHC. Furthermore, these works show some limitations. The paper of Mentoer and Friedrich (2007) is limited by the differences in the size of the students subgroups considered and their context-specific nature which bound the generalisability of the results. The study of Oosterbeek *et al.* (2010) suffers a lack of external validity and the results are influenced by diverse learning programme characteristics (entrepreneur team's size, duration, voluntary participation, credit points earned). In general, the meta-analysis of Martin *et al.* (2013) underlines how the results are conflicting (the relationships are positive, negative or absent at all) and ambiguous. Hence, there is a need to further deepen this matter and fill the related knowledge gap.

According to these premises, by applying Ajzen's above-mentioned model, this study aims to investigate the impact of EE on EI to start a new business and on the formation of individual IC, with a specific focus on ErHC.

In this way, such explorative research also contributes to the theoretical debate by addressing the challenges and the research gaps that are posed by the previous research with regard to quantitative methods and frameworks to assess IC components (Tan *et al.*, 2008; Goebel, 2015; Dimov, 2017). To tackle these issues, the study considers two different samples. The first sample involves university students, while the second one involves academics (e.g. scientists, technical staff, PhD candidates) who participated in a university BPC. These two groups differ from each other in at least three ways: EE level (undergraduate vs master's or higher); characteristics of EE courses (theory-based vs training- and practice-based); and position occupied along an ideal entrepreneurial process (from an entrepreneurial latency phase to a start-up decision phase) (Blanchflower *et al.*, 2001; Passaro *et al.*, 2017).

The paper is structured as follows. After this introduction, the literature review and research hypotheses are discussed in the second section. The third section reports the methodology, while the fourth and fifth sections present findings and discussion. The last section is dedicated to the conclusion, implications, limitations and future research.

Literature review and hypotheses

According to the business and managerial literature, IC can be interpreted as a set of intangible assets through which firms can derive competitive advantage, increase profit and create value (Sáenz *et al.*, 2009; Maditinos *et al.*, 2011; Buenechea-Elberdin, 2017). It should be emphasised that the majority of scholars agree to sustain that IC is one of the most important resources, especially in the first steps of complex business start-up processes and for business competitiveness and profitability (Colombo *et al.*, 2004; Zéghal and Maaloul, 2010; Hormiga *et al.*, 2013).

Some scholars have tried to individuate, select and measure the IC elements that can be considered to be the key value drivers in supporting the value creation process and firm performance. However, this task has proven to be difficult to achieve due to the complex nature of these assets and the large number of organisational and individual variables that must be taken into account (Kannan and Aulbur, 2004; Choong, 2008; Grimaldi *et al.*, 2013).

By considering the widespread breakdown of IC in human, relational and structural (or organisational) capital (Kaufmann and Schneider, 2004), a large stream of the managerial literature (Davidsson and Honig 2003; Bosma *et al.*, 2004; Ployhart and Moliterno, 2011) focuses on the role that is played by HC as a driving force of the other two IC components (Unger *et al.*, 2011; Hormiga *et al.*, 2013; Matricano, 2016). This breakdown has also been adopted with reference to the IC of university system (Sánchez and Elena, 2006; Fini *et al.*, 2011; Secundo, De Beer, Schutte and Passiante, 2017), whereas HC refers to students, technical and administrative staff, PhDs, lecturers, professors in the possessing of certain types of knowledge and skills.

HC is supposed to be a potential source of innovation and a key element to help firms to face environmental uncertainty and complexity (Davidsson and Honig, 2003; Hormiga *et al.*, 2011; European Commission, 2012). In the context of the university system, the HC perspective was one of the most-used theoretical frames for the prediction of a variety of entrepreneurial behaviours such as becoming a nascent entrepreneur or self-employed, new venture formation and performance (Markman *et al.*, 2005; Bornemann and Wiedenhofer, 2014; Dimov, 2017).

Given that start-ups rely on founders' knowledge resources, experience and intuition as well as their motivation and commitment (Thompson, 2004; West, 2007; Colombo *et al.*, 2010), the development of specific entrepreneurship knowledge should logically improve founders' ErHC assets and support the predisposition towards entrepreneurial choice (Unger *et al.*, 2011; Martin *et al.*, 2013; Dimov, 2017). In other words, ErHC represents the key IC component in the early stage of the entrepreneurial process, during which EI occurs (Reynolds and White, 1997;

Hisrich *et al.*, 2005; Passaro *et al.*, 2017). The effectiveness and appropriateness of this process is a key requisite for new ventures' success and survival.

In this view, a key role can be performed by universities with the aim to develop the aforesaid elements (Galloway and Brown, 2002; Fayolle and Gailly, 2009; Elia and Secundo, 2014; Secundo, Del Vecchio, Schiuma and Passante, 2017). Because universities are considered to be key institutional actors in national innovation systems, the use of higher education to affect IC enforcement has been common in the scientific literature in the last few years. This occurs because beyond research and teaching aims (the generation and dissemination of knowledge at the individual level), universities increasingly are involved in so-called third mission addressed to support new venture creation by reinforcing their entrepreneurial university side (Sánchez and Elena, 2006; Laredo 2007; Thomas *et al.*, 2014). Hence, a specific link between EE and ErHC is supposed (Peña, 2002; Bosma *et al.*, 2004; Unger *et al.*, 2011).

Therefore, it is quite reasonable to expect that EE is at least somewhat linked to the positive emergence of EI and ErHC. In other words, EE is supposed to improve the specific component of HC that is devoted to entrepreneurship (ErHC) (Martin *et al.*, 2013) based on the provision of appropriate knowledge, training activities and initiatives (Kolvereid and Moen, 1997; Fayolle and Gailly, 2009; Secundo *et al.*, 2010). Coherently, a direct link between EE and the emergence of EI has been proposed and analysed (e.g. Soutaris *et al.*, 2007; Rodrigues *et al.*, 2010; Bae *et al.*, 2014). Finally, a relationship between EI and ErHC may logically exist as people who demonstrate that relevant EI are more interested in enriching their set of business and managerial competencies and skills. Figure 1 synthesizes the relationships that are discussed above. In the next two sub-sections, these aspects are further deepened, and the related hypotheses are defined.

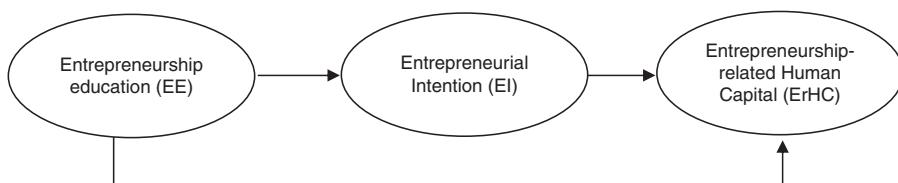
EE and EI

Consistent with the literature with regard to an ideal entrepreneurial process, the decision to start an enterprise is preceded by the emergence of the intention to follow an entrepreneurial path and to become an entrepreneur (Reynolds and White, 1997; Blanchflower *et al.*, 2001; Hisrich *et al.*, 2005). This justifies the relevant attention that has been paid in the last 20 years by scholars to the prediction of EI.

According to one of the most-adopted EI model, Ajzen's (1991) TPB, an individual's intention to engage in the entrepreneurial process is positively shaped by three main constructs: personal attitude (PA) towards entrepreneurship (the degree to which the individual holds a positive or negative personal valuation with regard to the adoption of that behaviour); subjective norms (SN) (the perceived social pressure to engage in or not engage in specific entrepreneurial behaviour); perceived behavioural control (also referred to as self-efficacy, intended as the subjective perception of the feasibility of assuming entrepreneurial behaviour).

As mentioned above, the majority of contributions that apply the TPB state that, from a general viewpoint, the improvement of EE, provided by the university system, indirectly leads to the emergence of EI via TPB constructs (e.g. Rodrigues *et al.*, 2010; Fini *et al.*, 2012; Vanevenhoven and Liguori, 2013). More in details, the rationale is that EE allows for a

Figure 1.
The relationships
linking EE,
EI and ErHC



familiarisation with entrepreneurial logic, typical challenges and common procedures of entrepreneurship. In addition, beyond the transfer of knowledge about entrepreneurship in general, and the methods to successfully manage an enterprise, university EE also implies the presence of a conducive micro-environment to develop an entrepreneurial cultural pattern and the provision of a network of relationships with other research centres, established firms and consultants (Laredo, 2007; Kibler, 2013; Valliere, 2017). However, some scholars do not find a significant relationship between EE and EI (Fayolle and Gailly, 2009; von Graevenitz *et al.*, 2010; Sánchez, 2013). Counter-effects have even been discovered for students who had previously significantly been exposed to EE (Oosterbeek *et al.*, 2010; Fayolle and Gailly, 2015) such that individuals could be discouraged by a realistic view of what is needed to start one's own business and of the criticalities that are connected with its management.

These criticalities have been addressed by few rigorous studies based on the differences among the adopted methodologies (Peterman and Kennedy, 2003) and measurement problems of the EI concept (Valliere, 2017) and some of the intrinsic limits of this approach (Lam, 2011; Fini *et al.*, 2012). In fact, as individual perceptions of the same phenomenon can differ, people can attribute varying degree of importance to the same factors that derive from the external environment but which influence one (or more) of the three TPB constructs, and hence indirectly the intent.

As the existence of an unquestionable relationship among the impact of specific university EE on individuals' EI has not yet been demonstrated, there is a need for further investigations (Liñán *et al.*, 2011; Fayolle and Gailly, 2015). Thus, we propose the following hypothesis:

H1. EE positively indirectly affects EI through TPB.

As EI is a complex and multifaceted concept, it is conceivable that some individual reactions, as a consequence of the provision of EE, can somehow slip out from the basic constructs of TPB. Specifically, the emergence of EI could be influenced by specific contingencies and situational characteristics that may modify individual orientations (Unger *et al.*, 2011). In this view, Dimov (2017) claims that subjective behaviours could also be affected by qualitative elements during the entrepreneurial process that are difficult and complex to detect. For instance, it has been showed that the emergence of EI as result of education can lead to a different path if people act individually or as part of an entrepreneurial team (Gartner *et al.*, 1994).

These assumptions could explain the presence of the above-mentioned ambiguous results with regard to the relationship between EE and EI by applying the TPB model, regardless of the robustness of the model. In fact, the described individual orientations are not easily mediated by the TPB model, and they can be strong enough to directly influence EI. In other words, we consider interesting to verify the direct relation between EE and EI (namely a relation not mediated by the constructs of the TPB model). Thus, we propose the following hypothesis:

H2. EE positively directly affects EI.

In recent years, several studies state that higher levels of the entrepreneurial mindset can be reached through learning and higher education at both the secondary and tertiary levels (European Commission, 2012, 2015; Sánchez, 2013). The impact of each educational level on entrepreneurial choice tends to vary, not only because the determinants of every educational level often differ but also because each one has its own peculiarities, methods, objectives and resources (Politis, 2005; Jiménez *et al.*, 2015).

As discussed above, the composition and availability of entrepreneurial knowledge and a competencies toolbox are traditionally considered to be the key components that positively

influence individuals' predisposition towards entrepreneurship (Rae, 2010; Thomas *et al.*, 2014; Secundo, De Beer, Schutte and Passiante, 2017), encouraging perceived attractiveness and the personal feasibility of self-employment. Therefore, we can suppose that the higher the level of EE, the higher the direct or indirect effect on EI will be (Galloway and Brown, 2002; Souitaris *et al.*, 2007; Bae *et al.*, 2014). Additionally, it is possible to suppose that the specific training or practice-based characteristics of the course that is attended, by mainly providing individuals with core knowledge and skills that are related to starting a business, should positively affect the emergence of EI (Von Graevenitz *et al.*, 2010; Passaro *et al.*, 2017). Thus, we propose the following hypothesis:

H3. The direct and indirect impact of EE on EI is influenced by the level and specific characteristics of EE courses.

EE and ErHC

As discussed above, the leading scholars sustain that EE is able to positively influence a specific component of IC that is represented by HC. This influence could reasonably be stronger when it specifically refers to the effect of EE towards ErHC that is required to successfully discover, identify, exploit and manage an entrepreneurial opportunity (Davidsson and Honig, 2003; Politis, 2005; Davidsson, 2015). ErHC denotes the knowledge base and capabilities that pertain to entrepreneurship which are developed through business experience or continuous higher EE programmes (Rodrigues *et al.*, 2010; Martin *et al.*, 2013; Sánchez, 2013).

Although it is difficult to predict the factors that encourage people towards the entrepreneurial choice, ErHC usually strengthens individual PAs, intensity of motivation, role model imitation and self-efficacy. In other words, the continuous enforcement of one's own ErHC is an indispensable process to successfully face entrepreneurial and managerial issues, criticalities and barriers to growth and nascent business survival.

Moreover, individuals can be encouraged to further enrich their set of ErHC assets when they demonstrate relevant EI. Following the desire to start a business, individuals may attempt to maximise the usefulness of the training and educational courses that they attended in universities, for instance, by paying great attention to the lessons or at the lived experience.

However, in the literature, conflicting and counter-effect results have been reported with regard to the impact of EE on ErHC (Pittaway and Cope, 2007; Oosterbeek *et al.*, 2010). This paradoxical result could depend on personal absorptive capacity, attitudes and motivation, as well as on the variables that are used to measure HC, which are often considered to be underestimating proxies (Goebel, 2015; Dimov, 2017).

As most impact studies claim that EE supports, sometimes to limited effect, individuals in the development of their own ErHC assets (e.g. Peña, 2002; Martin *et al.*, 2013; Dimov, 2017), we propose the following hypothesis:

H4. EE positively directly affects ErHC.

Consistent with the TPB model, it is possible to state that the impact of EE on ErHC could also be mediated by PA, behavioural aspects and social pressure (Lam, 2011; Thomas *et al.*, 2014; Fayolle and Gailly, 2015). Given this possibility, it could be interesting to analyse the indirect impact of EE on ErHC using a TPB model considering such elements as the antecedents of entrepreneurial choice. Additionally, it is known that personal features can affect the ErHC formation process. Therefore, the analysis of the impact of EE on ErHC using a TPB model would facilitate our understanding of the role of the PAs and other factors. Indeed, as aforementioned, very few contributes specifically addresses the relationship between EE and ErHC (Mentoer and Friedrich, 2007; Oosterbeek *et al.*, 2010).

Moreover, it is not clear how education in entrepreneurship is specifically associated with increases in ErHC assets, also as confirmed by the meta-analyses of Martin *et al.* (2013) and Unger *et al.* (2011). In the light of the above statements, we propose the following hypothesis:

H5. EE positively indirectly affects ErHC using a TPB model.

As explained above, EE positively affects the ErHC formation process. Consequently, it is conceivable that higher EE levels will positively affect the development of ErHC (Hormiga *et al.*, 2011; Volery *et al.*, 2013). Additionally, a higher degree of similarity among learning, application context and content domains positively affect the ErHC formation process. In other words, learning is more easily achieved in near contexts (Thompson, 2004; Visintin and Pittino, 2014). As characteristics of training-based courses are supposed to provide core knowledge and skills with regard to a start-up (Peña, 2002; Colombo and Grilli, 2010), they should be more context and industry oriented. In applying these concepts, it is possible to suppose that training-based EE courses might have a more effective impact on the ErHC formation process than theory-based ones. Thus, we propose the following hypothesis:

H6. The (direct and indirect) impact of EE on ERHC is influenced by the EE level and the specific characteristics of EE courses.

Methodology

Subjects

The data collection was performed at the end of 2013. Coherently with the explorative nature of this research, two samples of students and academics (“university scientist, most often a professor, sometimes a PhD student or a post-doc researcher”; Franzoni and Lissoni, 2009, p. 1114) who were participants at a BPC with different features were invited to complete an online questionnaire.

In particular, the samples are different in terms of:

- (1) educational level (undergraduates vs a composite group made up of graduates, master students, masters, PhD students, PhDs, post-doc, professors);
- (2) specific characteristics of the EE courses (ranging from traditional theory-based vs training-based courses, whereas students attend two-three standard curricular courses of business economics, managerial economics and innovation management, while BPC participants attend courses on entrepreneurship and business planning and participate in collateral activities such as mentor and incubator meetings, pitch sessions, lean startup workshops, meetings with entrepreneurs and/or startuppers); and
- (3) position in the entrepreneurial process (students are in a phase of entrepreneurial latency, while BPC participants have already in some way shown EI; Blanchflower *et al.*, 2001; Hisrich *et al.*, 2005, Passaro *et al.*, 2017). These differences are crucial to verify the role of higher education on the creation of EI and ErHC.

The first sample includes students who are enrolled in the undergraduate programme in management engineering of a university in the Campania region. The students attended between two and three basic courses in business/managerial economics and innovation management. A total of 128 out of 250 enrolled students (51 per cent) properly completed the questionnaire and provided reliable feedback. The gender distribution reflects the distribution of the students who were enrolled, with a prevalence of males (64.4 per cent). The average respondents' age in the sample was 23 years old (standard deviation = 1.952).

The second sample includes academics who decided to volunteer in the “Start-Cup Campania 2013”, which is a BPC among academics of the seven regional universities.

To join the BPC, after a six-month training period, the participants must present a business plan with the purpose of launching a start-up. An independent judging committee awards the best business plans with small monetary prizes. A total of 100 participants (55 per cent) provided reliable feedback. The gender distribution reflects the distribution of the enrolled participants, with a prevalence of males (65 per cent). The average respondents' age in the sample was 33 years old (standard deviation = 3.574). The composition of the sample includes assistants, associates and full professors (17 per cent), PhDs/PhD students and fellows (4 per cent), technical staff (18 per cent), collaborators with contract/post-doc (48 per cent) and others (13 per cent).

Therefore, according to the three above-mentioned aspects and the characteristics of each involved group, we can derive that the components of the first sample show a lower educational level, have attended only theory-based courses and can be considered to be latent or potential entrepreneurs, by occupying very initial positions along the ideal entrepreneurial process that precedes start-up. Conversely, the components of the second group show a higher educational level, have also attended training/practice-based courses and have taken part in entrepreneurship-driven collateral activities during a six-month training period of the BPC. Moreover, the latter can be considered to be intentional entrepreneurs as they have decided to participate in a BPC that is oriented to support a business start-up, which thus shows a more robust EI. In other words, considering the entrepreneurial process, the BPC participants can be positioned closer to the nascent entrepreneur position.

The questionnaires were administered through a website. In both of the groups, many respondents (an average of 22 per cent between the two samples) were excluded due to a high rate of item nonresponses or unit nonresponses.

The measurement model

The online questionnaire was made up of 31 multiple-choice questions that were divided into six sections that corresponded to the six latent estimated variables (EE, perceived behaviour control (PBC), SN, PA, EI, ErHC). For PBC, SN, PA and EI the queries of the questionnaire are the same as of Liñán and Chen's (2009) and Liñán *et al.*'s (2011) entrepreneurial intent questionnaire (EIQ).

The field analysis was aimed at measuring the latent variables that can be considered to be unobservable theoretical constructs and, as consequence, they can only be estimated by means of empirical observations. The queries of the questionnaire were defined on the basis of a literature review (e.g. Liñán and Chen, 2009; Liñán *et al.*, 2011; Unger *et al.*, 2011; Martin *et al.*, 2013). Specifically:

- EE was measured with a set of nine questions that were identified by reviewing the literature on the impact of the educational activities on both HC and EI (Zhao *et al.*, 2005; Fayolle *et al.*, 2009; Martin *et al.*, 2013). The nine questions aim to measure the knowledge base, parents' education and skills acquired in education programmes.
- PBC was measured with a set of six items that were defined on the basis of a literature review on EI (Liñán and Chen, 2009; Liñán *et al.*, 2011). The items aim to measure the perception of the ease or difficulty of becoming an entrepreneur, self-efficacy and perceived feasibility (Ajzen, 2002).
- SN was assessed through three questions that were defined by reviewing the literature on EI (Ajzen, 2002; Liñán and Chen, 2009; Liñán *et al.* 2011). The item aims to evaluate the perceived social pressure in engaging in (or not engaging in) entrepreneurial behaviours. In other words, it refers to the perception that "reference people" would approve of the decision to become an entrepreneur, or not (Ajzen, 2002).

- PA was measured by means of four items that were defined on the basis of a literature review on EI (Liñán and Chen, 2009; Liñán *et al.* 2011). These questions were designed to analyse the degree to which the individual has a positive or negative personal valuation of being (or becoming) an entrepreneur (Ajzen, 2002; Kolvereid and Isaksen, 2005).
- EI was assessed by a set of three items that aim to measure the effort that an individual will make to pursue an entrepreneurial career. The questions are the same as Liñán and Chen's (2009) and Liñán *et al.*'s (2011) EIQ.
- ErHC was analysed through six items that were defined on the basis of the literature review on IC and its antecedents (Peña, 2002; Choong, 2008; Martin *et al.*, 2013). The questions aim to measure the level of the (entrepreneurship-related) skills and competences that are possessed by interviewees.

In general, the questionnaire was structured to minimise the acquiescence bias (the tendency of individuals to agree with statements on a scale or instrument) by including some reversed items. With regard to the measurement instruments, tools and techniques, all of the variables were measured using the self-assessment answers to a widespread five-point Likert psychometric scale (1 = not at all; 5 = to a large extent).

As the model is made up of unobservable theoretical constructs, it is necessary to study the structural relationships between the variables that are not directly observable (latent) and those that are directly observed (manifest). To test the model, we used the partial least squares (PLS) approach, which allows for the estimation of latent variables through a recursive system that is based on the least squares. The software package that we employed was SmartPLS 2.0 (Ringle *et al.*, 2005). Structural equation modelling (SEM) was chosen to evaluate the validity of the theoretical model. In particular, the main multivariate regression techniques share one common limitation: each technique can only examine a single relationship at a time (Hair *et al.*, 2006). These "traditional" techniques do not enable us to test the researcher's entire theory with procedures that consider all possible information. SEM is a family of statistical models that seek to explain the relationships among multiple variables by examining a series of dependence relationships simultaneously. Moreover, PLS was chosen over the covariance-based SEM because it supports exploratory research, and the data distribution assumptions are less stringent than those of SEM. Additionally, PLS is capable of assessing indirect effects such as the mediation role of TPB model constructs between EE and ErHC.

Figure 2 shows the model estimated as it is defined on the basis of the research hypotheses (the second section) and the identified measurements.

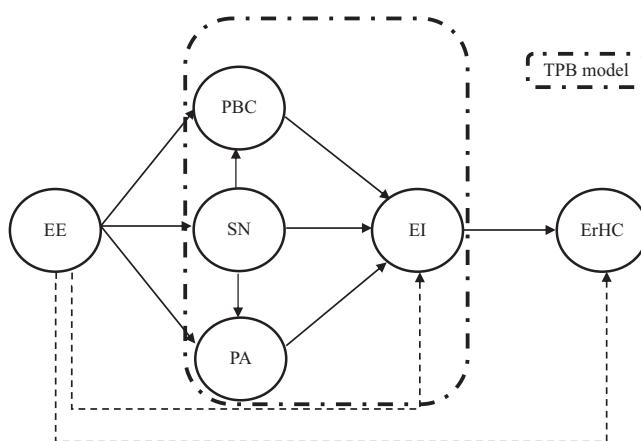
In the following two sections, the results are thoroughly presented and discussed.

Results

The paper aspires to assess the impact of higher education on the emergence of EI and on ErHC, considering the latter as a component of IC that strongly influences the entrepreneurial process. To this end, once the models were estimated, we compared the obtained results for each sample. A PLS path model consists of a measurement (or outer) model and a structural (or inner) model to comprehend the role of EE level and its specific characteristics. Therefore, the assessment of a PLS path model requires the analysis and interpretation of both the measurement and the structural models. Specifically, the model assessment follows a three-stage process:

- (1) assessment of the measurement model (evaluating the validity and reliability by composite reliability, average variance extracted (AVE) and discriminant validity);

Figure 2.
Model to be estimated



- (2) assessment of the structural model (by R^2); and
- (3) validation of the model (by bootstrapping technique).

The measurement model test refers to how the constructs have been operationalized and, thus, measured by using manifest variables. The objective of the analysis is to assess the reliability and validity of measures. In simple terms, reliability means that an instrument will consistently measure something; validity means that it will measure what it is intended to measure (Spector, 1992). The reliability of the constructs was evaluated using a composite reliability test.

Before proceeding to the analysis of each reliability measurement that is used in this study, we must note the three constructs, specifically, EE, PBC and ErHC. In our model, we defined the items that measure these constructs as formative and not as reflective. Reflective variables are caused by the construct and reflect its variation, while formative variables cause the latent construct. We decided to treat these items as formative rather than reflective variables for two reasons: they are the cause of the construct and not vice versa, and this change improved the quality of the model. Indeed, according to the literature, the use of formative variables, in some cases, such as business and management studies, can improve the model and, thus, can be more effective than reflective variables (Diamantopoulos and Siguaw, 2006). As such, the items are considered to be formative, and SmartPLS does not compute the reliability measures that are shown in Table I.

The composite reliability values that are obtained are higher than the defined thresholds for each construct. Therefore, our proposed constructs may be considered to be sufficiently reliable to measure the information for which they were designed.

With regard to the model validity, it is important to verify both the convergent validity and discriminant validity. Convergent validity is the degree to which multiple measures of

Sample	Construct	Composite reliability
University students	SN	0.773
	PA	0.810
	EI	0.753
BPC participants	SN	0.787
	PA	0.782
	EI	0.739

Table I.
Composite reliability
for the latent variables
as measure of internal
consistency

the same construct demonstrate agreement or convergence (Bryant, 2000). It is attained when multiple measures of an item represent the same underlying construct. Such measures should be strongly and significantly correlated. Convergent validity was assessed by the using the AVE value that is presented in Table II. To exhibit adequate convergent validity, the AVE of a construct must be greater than 0.5. In other words, the construct must account for more than half of the variance of its indicators.

Discriminant validity is the extent to which the measures of different concepts are distinct (Bryant, 2000). Discriminant validity was assessed using the method that was prescribed by Gefen and Straub (2005), specifically AVE analysis. AVE analysis is performed by comparing the square root of the AVE with the correlation between the construct and every other construct. The square root of the AVE should be much larger than the correlations with the other constructs (Fornell and Larcker, 1981). Table III shows the correlations between the constructs and the square root of the AVE.

In each case, the square root of the AVE is larger than the correlations of the construct with all of the other constructs. Therefore, the data passed the test of discriminant validity.

Once the reliability and validity of the measurement model have been verified, we can proceed to the evaluation of the structural model and, thus, to test our hypotheses. The evaluation of the structural model's quality is performed by examining the determination coefficients (R^2) of the endogenous latent variables. For each regression in the structural model, we have an R^2 that is interpreted similarly as in any multiple regression analysis, and it indicates the amount of variance in the endogenous latent variables that is explained by its independent variables (Table IV).

From the analysis, we find that the inner model appears to be correct. Indeed, according to the literature on PLS, the obtained R^2 coefficients can mainly be considered to be moderate values.

Figures 3 and 4 report the path coefficients (t -statistics are obtained by replicating the sample 1,500 times). It is important to specify that $H1$, $H2$, $H4$ and $H5$ were tested using the PLS approach, while $H3$ and $H6$ were verified qualitatively by comparing the results that were obtained for each group with the regard to the above-mentioned hypotheses.

In general, there are some differences between the two groups. Indeed, with regard to the students, the hypothesis about the positive indirect impact of EE on EI through TPB ($H1$)

Sample	Construct	AVE
University students	SN	0.536
	PA	0.522
	EI	0.579
BPC participants	SN	0.569
	PA	0.536
	EI	0.686

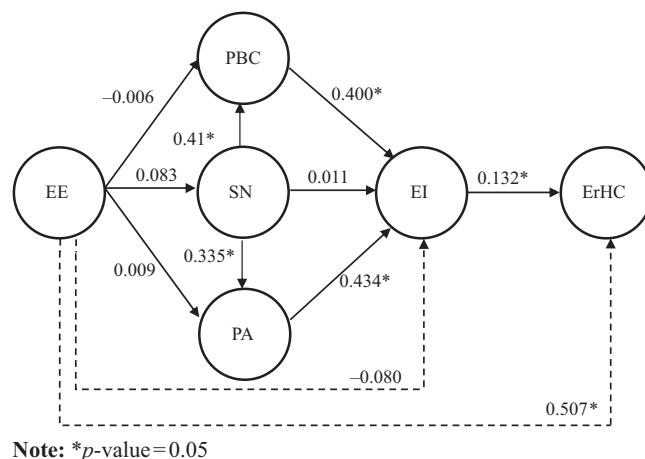
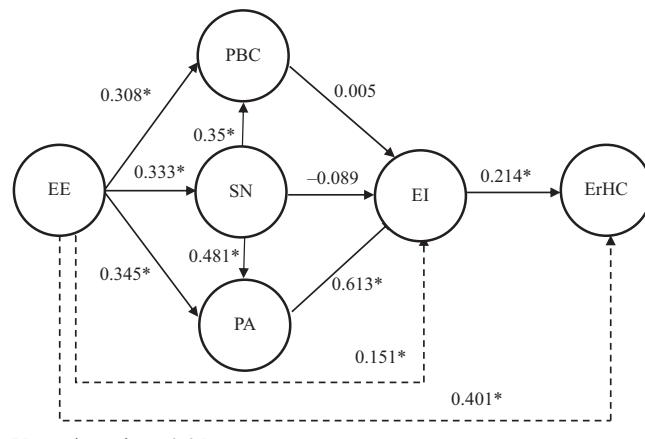
Table II.
Convergent validity

Sample	Construct	SRAVE	SIC
University students	SN	0.732	0.34; 0.31; 0.18; 0.50; 0.19
	PA	0.722	0.67; 0.30; 0.18; 0.50; 0.19
	EI	0.761	0.11; 0.30; 0.18; 0.50; 0.19
BPC participants	SN	0.754	0.60; 0.30; 0.22; 0.47; 0.53
	PA	0.732	0.59; 0.42; 0.22; 0.47; 0.53
	EI	0.828	0.35; 0.43; 0.22; 0.47; 0.53

Table III.
Discriminant validity

Table IV.
 R^2 for the endogenous
latent variables

Sample	Latent variables	R^2
University students	PBC SN PA EI ErHC	0.168 0.007 0.113 0.557 0.267
BPC participants	PBC SN PA EI ErHC	0.285 0.111 0.461 0.354 0.264

Figure 3.
Path coefficients for
university student
sample**Figure 4.**
Path coefficients for
BPC's participants
sample

must be rejected. This is specifically because EE does not affect the constructs of the TPB model (PBC, SN and PA) (path coefficients are not statistically significant), and it is possible to claim that EE does not affect the students' EI. Conversely, focusing on the BPC participants, *H1* can be accepted as EE directly influences the constructs of the TBC model, and it indirectly influences EI. Another important difference with regard to the role of PBC on the formation of EI is that while in the case of students, PBC has a positive and significant impact on EI, and in the case of BPC participants, the relationship is not statistically significant.

Focusing on *H2*, that is whether EE positively directly affects EI, it is possible to highlight another key difference between the two considered groups. Specifically, in the case of the students, it must be rejected, while in the case of BPC participants, *H2* can be accepted. According to these findings, it is possible to claim that the impact of EE on EI, both directly and indirectly, depends on the level and features of the EE (*H3*).

H4 and can be accepted in both cases, thus underling that the EE has a relevant direct impact on the ErHC. On the contrary, the *H5* can be accepted only for the BPC participants.

Based on these results, it is possible to claim that the *H6* (the direct and indirect impact of EE on ErHC is influenced by the EE level and specific characteristics) can be accepted. The differences emerged shows that the EE level and characteristics of the EE courses impacts positively on the ErHC formation in the two samples even though by means different relationship mechanisms and strength extent.

In addition, we also verified that ErHC affects EI with the aim of analysing the switching of a virtuous circle between the two elements, whereas EI positively affects the development of ErHC and, in turn, ErHC positively affects the formation of EI. The statistical significance of such a virtuous circle is proved (path coefficient 0,21; *p*-value = 0,05) only in the case of the BPC participants.

Discussion

Our results show that the education level (undergraduate vs master higher) and the specific characteristics of the educational activities (theory-based vs training- and practice-based) play key roles in the formation both of EI and ErHC. This means that there are some differences between the two investigated groups.

Specifically, the findings show that EE positively affects the constructs of the TPB model only in the BPC case. Focusing on the analysis of such results, it is necessary to highlight that the consequent impact on EI exclusively depends on the positive effect of an individual's PA (0,613). The impact of SN on EI is not unexpected as this result is consistent with other studies (Krueger *et al.*, 2000; Autio *et al.*, 2001; Liñán and Chen, 2009). Conversely, the statistically non-significant impact of the subjective perception of the ease/difficulty of making an entrepreneurial choice (PBC) on EI is unexpected. As highlighted by some scholars, this can be motivated by the fact that the knowledge of the many problems that are inherent a potential business start-up may discourage the entrepreneurial choice (Vanevenhoven and Liguori, 2013; Fayolle and Gailly, 2015).

With regard to the university student group, the whole set of statistics shows that the indirect impact of EE on EI is not statistically significant. Such a result means that EE cannot indirectly affect the formation of ErHC using a TPB model (see *H5*). Nevertheless, the results highlight that for the university students the formation process of EI (using the TPB model) uniquely depends upon individual PA and PBC.

Other differences between the two groups are illuminated with regard to the analysis of the direct impact of EE on EI (*H2*). In particular, it is possible to state that the EE courses (two-three business and management courses of the undergraduate programme in management engineering) that were attended by the students are not adequate to influence the formation of EI. This is likely due to: the specific characteristics of the EE courses that

were attended by the university students, which are characterised by a theoretical and wide-ranging entrepreneurial content; the initial positions that are occupied in the entrepreneurial process as they are far from making an entrepreneurial choice (Blanchflower *et al.*, 2001; Passaro *et al.*, 2017). The combination of these elements hinders the triggering of entrepreneurial orientation.

Therefore, it is possible to conclude that students' EI exclusively depends on their PAs, motivation and personal background. In other words, for the university students, there is no type of EE effect (or there is a very weak effect) on EI formation process. Conversely, for the BPC group, the direct and indirect impact of EE on EI is established. As the components of such group are, on average, older and more educated than the components of the student group, it is possible to identify that the impact of EE on EI can be intended as a long-term term effect. Moreover, this result could also depend on their higher absorptive capacity (Cohen and Levinthal, 1990), which characterises higher educated and experienced people such as academics. These last results are in line with the literature. By comparing the results that were obtained with regard to *H1* and *H2*, it is possible to emphasise that the two groups show a different behaviour in the formation process of EI (*H3*). The components of the second group with a higher education level and who have attended more training-based EE courses are more sensible and oriented towards the entrepreneurial path (Rodrigues *et al.*, 2010; Sánchez, 2013). By participating in a university BPC, these individuals have considered the possibility of following the entrepreneurial path and can be considered, in some way, to be intentional entrepreneurs. Therefore, it is possible to claim that the education level and the specific characteristics of EE, together with the decision to take part in a BPC, play important roles in differentiating between the two groups (Jiménez *et al.*, 2015; Passaro *et al.*, 2017).

Focusing on the direct impact of EE on ErHC (*H4*), it emerges that there are no significant differences between the groups. This finding reinforces the literature results, although there are conflicting findings (Martin *et al.*, 2013). These last results could be explained by considering that the formation process of ErHC could depend on independent mechanisms that are inherent in the received education. In other words, the present findings support those scholars (e.g. Unger *et al.*, 2011; Martin *et al.*, 2013; Dimov, 2017) and sustain that ErHC is a complex item that is composed of several subjective aspects that are difficult to interpret and whose conceptualization and measurement must be reconsidered, as has been underscored by recent contributions (Dimov, 2017). Finally, the impact of EE on ErHC is slightly higher for the first group. These results could be explained by the role that is played by business experience, which is expected to be greater for the BPC participants.

With regard to the effect of EE on ErHC by means of the TPB model (*H5*), the hypothesis is confirmed only for the BPC participants. In particular, the effect of EE on ErHC appears to be more relevant for the BPC participant sample. In fact, we observe that the positive effect of EE on EI (both direct and indirect) is channelled towards the development of the level of ErHC. In other words, EI itself amplifies the potential of EE in the reinforcement of ErHC, which thus provides relevant implications both for policy makers and aspiring entrepreneurs. Furthermore, the impact of EE on ErHC is consistent with the HC literature (Lam, 2011; Thomas *et al.*, 2014; Fayolle and Gailly, 2015).

With regard to the *H6*, as a consequence of the results that emerged from the analysis of *H4* and *H5*, it is possible to suppose that the EE level and the specific characteristics of EE courses have a positive impact on the ErHC formation mechanisms. In particular, it is possible to suppose, for BPC participants, that the TPB model plays a catalyst role in the ErHC formation process given that they have already shown an EI which motivates the individuals to improve their learning process. Conversely, the university students, who are in a phase of entrepreneurial latency and whose motivations are less stable over time (Liñán and Rodríguez-Cohard, 2015), leverage on factors that can more easily slip out from the TBP model.

This finding is consistent with results that are derived from the *H3* analysis, and with HC literature (Pittaway and Cope, 2007; Unger *et al.*, 2011). Furthermore, it is significant that the diverse behaviours of the two considered samples are in line with the contrasting results that have already been discussed in the literature with regard to the relationship between EE and HC development. Various implications can be drawn from this result, both for entrepreneurship policy and the university system.

To summarise, following this discussion, three relevant findings can be highlighted:

- (1) University EE has a direct positive impact on ErHC in both groups. In accordance with the literature, our results confirm that universities play an important role in supporting the development of HC assets and facilitate better support of an entrepreneurial choice. This means that universities should pay attention to the definition of programmes, policies and instruments to effectively pursue the so-called third mission (Franzoni and Lissoni, 2009; Rae, 2010).
- (2) A positive relationship among EE, EI and ErHC emerges. This relationship is mostly verified for the BPC participant sample, which is characterised by a higher education level, participation in training-based courses, and which includes individuals who are closer to becoming nascent entrepreneurs. Therefore, the EE level and the specific characteristics of the courses play a key role in the EI and ErHC formation process. Not by chance, some studies have shown that EE training-based courses, by providing attendants with core knowledge and skills that are related to business start-up, have a positive impact on the formation of EI (Martin *et al.*, 2013). Moreover, these findings lie in the well-established area of absorptive capacity (Cohen and Levinthal, 1990), as well as in the role of entrepreneurial teams, which allow for the sharing of responsibilities and facilitate learning processes (West, 2007). Finally, these findings can also explain why in the literature there are some contrasting results with regard to the impact of EE on the development of HC.
- (3) There is a virtuous circle between EI and ErHC (only for BPC participants), which is mutually reinforcing. In other words, EI prompts aspiring entrepreneurs to improve their ErHC assets; at the same time, a high level of ErHC increases the capacity to discover and exploit new business opportunities and to effectively manage a business.

Conclusions

Contribution

During the last few years, great attention has been paid to the analysis of the factors that enable an increase in individual IC, which is largely considered to be a key driver of business start-ups, as well as firm competitiveness. In particular, the HC component of IC is key to successfully discover, identify, exploit and manage entrepreneurial opportunities by means of the accumulation of those personal attributes (entrepreneurial knowledge, abilities and skills) that are known as ErHC.

From this perspective, universities can play an important role as they offer specific EE and other initiatives that can be finalised to support the entrepreneurial choice (e.g. Markman *et al.*, 2005; Gunasekara, 2006; Laredo, 2007). Despite the EE initiatives and programmes that are becoming more and more widespread, many scholars are sceptical about their effectiveness with regard to individuals' willingness to engage in entrepreneurial activity (Sánchez and Elena, 2006; Von Graevenitz *et al.* 2010; Vanevenhoven and Liguori, 2013). Because the entrepreneurial choice is a complex issue that is unstable over time, other factors that affect IC, in addition to EE, may come into play (Davidsson and Honig, 2003; Kolvereid and Isaksen, 2005; Dimov, 2017).

Given the above, this study aimed to investigate the impact of EE on EI to start a new business and on the formation of IC with a specific focus on ErHC (Peña, 2002; Martin *et al.*, 2013). Considering that there are very few contributions in the literature that analyse the relationship among EE, EI and ErHC, this paper intends to fill this literature gap.

To verify these aims, two samples were considered. The first one was composed of students, and the second one was composed of academics who were participating in a university BPC. The two groups differ from each other in terms of: education level (undergraduate vs graduate and academic staff); type of EE courses attended (theory-based vs training-based); and position occupied in the entrepreneurial process.

Three main findings come to light that emphasise the differences between the two groups in terms of the HC development process:

- (1) There is only a positive relationship among EE, EI and ErHC for the BPC participant group. In particular, EE does not influence students' EI, but it directly affects ErHC reinforcement. However, for the BPC participants, EE positively affects the formation of both EI and ErHC.
- (2) The level and specific characteristics of EE are key factors for the development of EI and ErHC.
- (3) The sample of BPC participants also reveals the presence of a virtuous circle between EI and ErHR through which they mutually reinforce.

Implications

Based on the discussed results, many implications can be derived with particular attention to universities, which remain the most suitable institutions to provide EE.

The paper has highlighted the importance of the training-based activities that are provided by universities and that a positive relationship among EE, EI and ErHC is preeminent for the BPC participants. This finding has implications for both the education activities of universities (first mission) and for the so-called third mission.

With regard to the latter, among the other initiatives, it is relevant for universities to reinforce the provision of new educational programmes and projects that are based on more appropriate operational approaches for the early phases of nascent entrepreneurship (lean startup workshops, spin-off programmes, BPCs, mentor and incubator meetings, pitch sessions, design thinking).

With regard to the first mission, EE courses that are provided to students should guarantee a proper mix of basic theoretical and/or formal knowledge on entrepreneurship and a training-based lean approach towards new ventures that addresses the development of a set of specific skills (team-working, critical thinking, networking, decision making).

Both for students and academics, universities should support individual motivation and the personal traits (creativity, risk-taking propensity, need for achievement and autonomy) that are consistent with entrepreneurship as a career choice. To this end, in addition to traditional EE courses, new approaches must be proposed to teach individuals to think like entrepreneurs and not like organisational employees. Examples of these approaches include specific initiatives and projects (e.g. start-up weekends, demo days, pitch events, hackathons, prize challenges) with the involvement of entrepreneurial actors (entrepreneurs, startuppers, venture capitalists, business angels, start-up testimonials), and contamination mechanisms to provide aspiring entrepreneurs with the fast matching and cross-fertilisation of ideas, knowledge, stimulus (e.g. contamination labs, fab labs or working spaces).

From a policy perspective, these actions must be coherently developed with the EU and national entrepreneurial and industrial policies. In other words, policy makers should define proper policies, guidelines and frameworks to support universities in the improvement of

their educational activities and programmes to strengthen the entrepreneurial process. Moreover, policy makers should favour incremental learning processes that evolve throughout professional lives and that are consistent with the concept of entrepreneurial learning as a lifelong process. Such an approach should view knowledge as a process that is continuously shaped and revised with every new experience (e.g. Politis, 2005). From this perspective, particular attention should be paid to academics, especially considering that their EI tends to translate into innovative new ventures (start-ups, spin-offs) and that they spread knowledge and entrepreneurial culture.

Limitations and future steps

This study shows some limitations. First, the samples investigated are dimensionally limited and only refer to people who live in a specific Italian region. Second, the individuals who answered to the questionnaire may have different perceptions with respect to those who did not answer, and there would be no guarantee that the respondents are representative of the population. In other words, for practical purposes a non-probability method of sampling was used, and therefore the final results could not be viewed as representative of the populations. Third, the content and features of the EE courses that were attended by the participants are university specific. Such limitations are in line with the explorative nature of this work and contribute to reduce the generalisability of the results.

In addition, the research does not include longitudinal data to control the change of EI over time. Furthermore, no pre-tests were performed prior to the exposure to EE courses for individuals with higher levels of EI. These limits call for additional field studies and the extension of the sample analysis to universities from other Italian regions or different countries.

In spite of these limitations, this paper confirms the importance of EE as a key driver to develop both the intention towards start-ups and entrepreneurship-related HC assets to trigger the aforementioned virtuous circle.

An essential research agenda of this paper can be addressed to replicate or extend the field investigation in the following directions: to combine the two samples and then distinguish groups of individuals according to their education level by using a categorical variable in an SEM or by adopting a cluster analysis approach; to perform a comparative analysis with a new control sample that is composed of academics who did not participate in the BPC to investigate additional factors other than educational level and the impact of specific characteristics on EI and ErHC; to increase the sample size and to consider additional regional contexts; and to deepen the mechanisms and variables able to influence the direct relationship between EE and EI.

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