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Entrepreneurial education and learning at universities: exploring multilevel contingencies

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ABSTRACT

Despite the worldwide increase in entrepreneurship education offered at universities, there is an ongoing debate whether and under which conditions this type of education contributes to students' entrepreneurial learning. Building on human capital theory, we hypothesize that the exposure to various entrepreneurship education initiatives has an inverted U-shaped relationship with entrepreneurial learning outcomes. We also argue that this relationship is moderated by the entrepreneurial experience of the students, the teaching pedagogy applied in entrepreneurial initiatives offered at the university and the prevalence of opportunity-driven entrepreneurship in the country. A multi-level analysis on a cross-country sample of 87,918 students resulting from GUESSS ('Global University Entrepreneurial Spirit Students' Survey') strongly confirms our hypotheses, and allows us to discuss implications for researchers, educators and policy makers with respect to the nature of entrepreneurial learning, the design of entrepreneurial education programs, as well as the contextual conditions that impact entrepreneurial learning outcomes.

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1. Introduction

« Έτσι, δεν γνωρίζω »
« I know that I know nothing »
(Socrates)

Entrepreneurship Education (EE), encompassing the pedagogical courses, programs and processes offered to students to develop or strengthen their entrepreneurial traits, attitudes and skills (Bae et al. 2014; Fayolle, Gailly, and Lassas-Clerc 2006), belongs to a broad set of initiatives that have been adopted by educational institutions and are stimulated by policy makers in response to the widespread belief that entrepreneurship acts as an engine for economic prosperity (Laukkanen 2000; Shah and Pahnke 2014). Universities, in particular, are challenged to prepare students for a labour market where the ability of behaving and

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thinking in an entrepreneurial and proactive way is a key driver of success (Audretsch 2014; Urbano and Guerrero 2013). While initially the main objective of EE was encouraging students to create new ventures, more recently there has been a shift in focus to a broader concept which emphasizes entrepreneurship as a way of thinking and behaving (Leitch, Hazlett, and Pittaway 2012; Mustar 2009). In fact, in a report on entrepreneurship in higher education, the European Commission (2008, 7) emphasizes that 'the benefits of entrepreneurship education are not limited to start-ups, innovative ventures and new jobs' but rather to 'an individual's ability to turn ideas into action and it is therefore a key competence for all, helping young people to be more creative and self-confident in whatever they undertake'. Therefore EE should aim at stimulating entrepreneurial learning (EL) (Neck and Greene 2011).

Building on the conceptual arguments of Politis (2005) we define EL as the key process through which students develop the entrepreneurial knowledge that facilitates them to identify and act upon entrepreneurial opportunities. Entrepreneurial knowledge is a multidimensional concept, which includes the *understanding* of actions to start a business, and of typical attitudes, values and motivation of entrepreneurs, as well as the *development* of practical skills, abilities and resources to identify an opportunity and act upon it (Neck and Greene 2011; Souitaris, Zerbinati, and Al-Laham 2007). Research has challenged the view that individuals are simply genetically endowed with entrepreneurial knowledge and has suggested that people develop it as an *outcome* of the EL process in the course of their entire lives, involving a variety of life experiences that are not limited to founding a new firm (Cope 2005). EL can be experienced by individuals even before being directly engaged into start-up activity (Haase and Lautenschläger 2011), for instance through education (Unger et al. 2011). In fact, the context in which individuals develop entrepreneurial knowledge has been illustrated to be, at least partially, replicable in an educational setting (Pittaway and Cope 2007b). As a result, the outcome of the EL process at universities is supposed to increase student's stock of entrepreneurial knowledge (Haase and Lautenschläger 2011; Souitaris, Zerbinati, and Al-Laham 2007).

Despite the importance of EE in the political agenda, the growing number and heterogeneity in content and pedagogies of EE offerings, and the recommendations on EE curricula formulated by many academics (Fayolle 2013; Pittaway and Cope 2007a), research has largely failed to provide a clear answer to the question 'to what extent and under which circumstances do students learn from the exposure to EE' (Fayolle and Gailly 2015; Martin, McNally, and Kay 2013). Reported effects among EE studies vary considerably (Naia et al. 2014). Whereas most studies hint to a positive link between EE and EL outcomes, showing that EE improves students' entrepreneurial skills (DeTienne and Chandler 2004; Sánchez 2011, 2013) and beliefs (Peterman and Kennedy 2003; Volery et al. 2013; Walter and Dohse 2012, among others), others have found mixed (von Graevenitz, Harhoff, and Weber 2010; Oosterbeek, van Praag, and Ijsselstein 2010), statistically non-significant (Souitaris, Zerbinati, and Al-Laham 2007) or even negative relationships (Mentoor and Friedrich 2007). Moreover, in many cases the benefits of EE have been misinterpreted due to methodological weaknesses in the research design (Fayolle 2013; Rauch and Hulsink 2015). Beyond the empirical limitations, this literature suffers from several theoretical shortcomings: a lack of understanding of the mechanisms that explain the evolution of students' entrepreneurial knowledge caused by EE; a limited conceptualization of the impact caused by EE, which mostly considers whether EE has been imparted or not and neglects the effect of increasing exposure to additional EE initiatives; and scarce knowledge of the contingent factors that shape EE outcomes (Bae et al. 2014; Martin, McNally, and Kay 2013).

Building on human capital theory (Becker 1964), a perspective identified as a useful lens to analyse the impact of EE (Bae et al. 2014; Martin, McNally, and Kay 2013; Volery et al. 2013), our study extends research executed in this field by (i) measuring the extent to which the various EE initiatives university students are exposed to affects their EL outcomes, and (ii) adopting a contingent approach to find out how the impact of these initiatives is moderated by the student's entrepreneurial experience, the universities' entrepreneurial teaching pedagogy, and the diffusion of opportunity-driven entrepreneurial activity in the country. Researchers have emphasized the importance of such multilevel perspective as crossing multiple levels of analysis yields a more holistic understanding of the effect of EE (Bae et al. 2014).

We test our hypotheses on a sample drawn from the GUESSS 2011 ('Global University Entrepreneurial Spirit Students' Survey'), which is an international research project that biannually collects data on about 100,000 university students in different study fields and at different higher education levels (e.g. undergraduate, graduate, PhD), and this from 26 countries and 489 universities. Multilevel regression analysis is used to test (1) the effect of the various EE initiatives students are exposed to on EL outcomes and (2) the moderating effect of the characteristics of the individual, the university offering and the national context on the EE–EL relationship. The strong advantage provided by the GUESSS survey is that it ensures rigour in the causal association of EE and EL outcomes, as the respondents specifically attribute their evaluation to the university EE.

Our findings illustrate that the exposure to additional EE initiatives contributes to an increase in students' EL outcomes, but only up to a certain threshold, beyond which students cannot further develop or actively 'construct' (Mueller and Anderson 2014) their level of entrepreneurial knowledge. Beyond that point, the EE–EL relationship turns negative because taking more EE makes students more critically aware of their learning gaps and causes them to question and 'depreciate' (Parker 2013) the value of what has been learnt at university. Second, students' previous entrepreneurial experience, as well as a practice-oriented university teaching pedagogy, prepare students to benefit more from additional EE initiatives, thus respectively retarding and displacing the inflection point where the EE contribution to EL outcomes turns negative. Finally, the diffusion of opportunity-driven entrepreneurial activity in the country acts as a negative moderator (i.e. anticipates the inflection point), as in these countries students know that entrepreneurship may demand higher skills and requirements and thus they depreciate more severely their human capital obtained from education.

The findings of this paper are important for theory, research and practice. First, we contribute to the understanding of EL by exploring the extent and circumstances under which students are able to construct entrepreneurial knowledge. Second, by studying the transformation of exposure to EE initiatives into learning outcomes, a central issue of EL theorizing (Politis 2005), our paper advances the understanding of the transformation of additional investments in human capital (EE) into human capital assets (EL outcomes) (Martin, McNally, and Kay 2013; Unger et al. 2011). Third, by focusing on learning as a result of EE we make an important contribution to the literature that discusses EE programs. We suggest that the exposure to additional EE initiatives – besides growing students' entrepreneurial knowledge – stimulates self-reflection and makes students more critically aware of their EL outcomes. Fourth, from an applied research point of view, this study supports the value of adopting a holistic and multilevel perspective to understand EE and students' EL (Saeed et al. 2015; Walter and Dohse 2012). Finally, this work has some important practical implications as our

insights will help educators and policy makers to take decisions regarding the overall amount of EE initiatives and the related pedagogies based on contingencies such as the audience addressed and the dominant type of entrepreneurial activities in a country.

The remainder of the paper is organized as follows. In Section 2, we position our study in the EE, EL and human capital literature and develop our hypotheses. In Section 3, we describe sample, data acquisition, estimation technique and operationalization of the key variables. In Section 4 the empirical results are reported. Section 5 discusses the results and illustrates theoretical contributions, practical implications, limitations and future research directions. Section 6 concludes the paper.

2. Conceptual development

To explain the EL process, or the transformation of EE into entrepreneurial knowledge, we build on human capital theory. In its original formulation, human capital is defined as the set of skills and knowledge that individuals acquire through investments in schooling, on-the-job training, and other types of experience (Becker 1964). It highlights that the acquisition of human capital is a learning process whereby life experiences are transformed into knowledge and skills (Marvel, Davis, and Sproul 2016). In the field of entrepreneurship research, a dynamic view of human capital has been used in order to distinguish human capital investments from human capital assets (Martin, McNally, and Kay 2013; Unger et al. 2011). While the former refers to the 'experiences such as education and work experience that may or may not lead to knowledge and skills', the latter are 'acquired knowledge and skills' (Unger et al. 2011, 343). Analysing the results of EE through the lens of human capital theory implies exploring the outcomes of the human capital acquisition process and, in particular, to what extent the educational experiences (EE as investment in human capital) become entrepreneurial knowledge (EL outcomes or human capital assets) (Martin, McNally, and Kay 2013; Volery et al. 2013).

2.1. The effect of entrepreneurship education at universities on entrepreneurial learning

In today's globalized and competitive environment, knowledge, innovation and entrepreneurship are crucial to economic and societal development (Audretsch 2007). As a consequence, universities play a central role in economic systems (Guerrero, Cunningham, and Urbano 2015) as they generate and transfer new knowledge, develop qualified human capital and foster the development of an entrepreneurial society (Audretsch 2014). In particular, universities are seen as a favourable environment to stimulate EL and support students in the development of entrepreneurial knowledge (Haase and Lautenschläger 2011; Souitaris, Zerbinati, and Al-Laham 2007). Modern universities have therefore extensively included EE in their curricula (Fayolle 2013).

Given our definition of EE (i.e. pedagogical courses, programs and processes offered to students to develop or strengthen their entrepreneurial traits, attitudes and skills in general), we specifically refer to programs whose *scope* is to develop entrepreneurial knowledge (cf. Souitaris, Zerbinati, and Al-Laham 2007). The challenge of EE is to offer both codified and tacit elements that constitute entrepreneurial knowledge and are a result of the EL process (Haase and Lautenschläger 2011). While classic education is more likely to provide the

codified elements of entrepreneurial knowledge (e.g. hard facts about business creation), concrete experiences gained through entrepreneurial practices or practical education programs usually act as a source of tacit knowledge (e.g. entrepreneurial practical skills and abilities). In general, the *audience* of EE programs at university consists of university students. Given that EE is widespread throughout campuses, students at any level and of all fields of study are now increasingly exposed to EE. It is worth mentioning that these students may include, but are not necessarily limited to, actual or even prospective entrepreneurs. In order to connect conceptual knowledge to a range of entrepreneurial skills EE adopts a wide range of *methods* – such as conventional lectures, seminars, and workshops, focus groups, teaching of peers etc. (Gibb 1996) – and disciplines (Pittaway and Cope 2007a). Since entrepreneurship is a multi-disciplinary field, EE programs embrace a variety of *topics* and themes, such as innovation, finance, team building and leadership (Edelman, Manolova, and Brush 2008; Gielnik et al. 2015; Mustar 2009).

Investments in human capital such as EE result in the absorption and combination of new knowledge, which in turn enables students to better engage in the process of opportunity-seizing and to be more motivated to act upon them (Bae et al. 2014; Souitaris, Zerbinati, and Al-Laham 2007). Based on this, a number of studies have found a positive effect of EE on EL outcomes such as understanding of key concepts of entrepreneurship (Volery et al. 2013), abilities to discover new opportunities (DeTienne and Chandler 2004) and positive attitudes towards entrepreneurship (Peterman and Kennedy 2003; Walter and Dohse 2012). Martin, McNally, and Kay (2013) report extensive evidence about this relationship; the authors also commend future studies to address not only the effect of EE as such, but also of the degree of exposure to EE, on EL outcomes. This resonates with empirical studies that recognize the benefits of offering an increasing and articulated amount of EE initiatives to students (Saeed et al. 2015; Walter, Parboteeah, and Walter 2013).

However, next to the positive effect of EE, the literature recognizes the existence of ambiguous effects on EL outcomes, showing mixed, statistically non-significant or even negative relationships with both EE (Mentoor and Friedrich 2007; Oosterbeek, van Praag, and Ijsselstein 2010) and the level of EE exposure (Menzies and Paradi 2003). Human capital theory offers theoretical lenses to explain the downsides of this process. First, even if the learning opportunities to which students are exposed in an educational context contribute to the acquisition of entrepreneurial knowledge, human capital acquired merely from EE may be subject to diminishing returns, reaching a saturation point (Becker 1964). Individuals keep learning as long as they are exposed to novel events and are able to interpret and build knowledge on them thanks to the cognitive abilities acquired by previous experience (Morris et al. 2012). Building on this argument we suggest that the extent to which EL outcomes are achievable at university through EE is restricted. Despite the fact that EE initiatives offered in an educational setting can be very diversified and can get very close to the entrepreneurial experience, they simulate the complexity and uncertainty of the entrepreneurial process only up to a certain level (Chrisman, McMullan, and Hall 2005; Pittaway and Cope 2007b). More specifically, it is hard to recreate those affective and socialization processes that are so important to the achievement of EL outcomes (Morris et al. 2012; Pittaway and Cope 2007b). Therefore, the extent to which students develop entrepreneurial knowledge relying only on EE may be imperfect (Mueller and Anderson 2014), resulting in a learning saturation point. At that point students do not have the means to further 'construct' (Mueller and Anderson 2014) entrepreneurial knowledge, without being directly engaged into entrepreneurial practice.

Second, whereas the human capital perspective (Becker 1964) provides a clear argumentation on how education generates learning (Martin, McNally, and Kay 2013), at the same time it discusses an opposing effect, as the *value* of what has been learnt can be subject to a process of *depreciation*; this indicates the loss of value of human capital assets (Parker 2013). In economic theory, this is due, for example, to job requirement changes or restructuring within the firm or the sector (De Grip and Van Loo 2002). In these situations, the stock of learning possessed by the individual loses value as it becomes inadequate to cope with new emerging features of the surrounding environment. In a similar vein, from a learning perspective, the environment challenges the individual and forces him/her to question the adequacy of what has been learnt (Piaget 1950). Through metacognition, i.e. the reflection upon learning (Haynie et al. 2010), the learner evaluates the consistency between the experiences from real life and his/her previous assumptions. According to Piaget, this phenomenon is at the basis of learning since it stimulates individuals to construct knowledge by adapting the acquired cognitive schemas to aspects of the reality never experienced before. For students exposed to EE, this reflection represents itself as a learning action, as it motivates them for further learning and makes them aware of their skills and limitations (Mueller and Anderson 2014).

Building on this, it has been suggested that EE enables students to realize when they are not yet ready to engage in entrepreneurship (von Graevenitz, Harhoff, and Weber 2010; Oosterbeek, van Praag, and Ijsselstein 2010). The exposure to an increasing number of EE initiatives encourages students to reflect on their cumulated stock of entrepreneurial knowledge and helps them in recognizing what still has to be learnt (Mueller and Anderson 2014). As students attend additional EE initiatives, their learning needs evolve, but the classroom cannot satisfy their matured cognitive expectations (Honig 2004). At this point, engaging in more EE may negatively affect students' evaluation of their EL outcomes. It is worth mentioning that this may not necessarily be an undesirable outcome from EE, if it helps students to realize that they need further life and work experience before engaging into entrepreneurial activities. Delaying entrepreneurial effort might be an appropriate result of EE; in fact, as shown by Wennberg, Wiklund, and Wright (2011) graduates that start a business after being employed in incumbent firms tend to found better-performing businesses.

For these reasons based on human capital theory, we offer a conceptual reconciliation of ambiguity in the relationship between EE and EL outcomes and argue that such relationship is non-linear. More specifically, EE increases learning until a saturation point is reached, and decreases afterwards.

Hypothesis 1: The relationship between the exposure to various EE initiatives and EL outcomes is curvilinear (inverted U-shape).

2.2. Contingencies of entrepreneurial learning at universities

Following the call of Marvel, Davis, and Sproul (2016), our study adopts a multilevel approach to assess the transformation of human capital investments in assets. Multilevel models allow a comprehensive understanding of EL in an educational setting as the researchers can control for the characteristics of the individual and the social context, as well as the way the individual learns (Fletcher 2007). As recommended by Martin, McNally, and Kay (2013) we include a number of relevant multilevel moderators, namely: (a) an *individual*'s entrepreneurial background; (b) the entrepreneurial teaching pedagogy as an attribute of the *education*; and (c)

the entrepreneurial activity in a country as a *national* contextual factor (Bae et al. 2014). *Taken together*, as shown in Figure 1, these moderators allow taking into account the effect of micro-, meso-, and macro-level contingencies of the EE–EL relationship that correspond respectively to the individual, university, and national level of analysis. The influence of these factors is discussed next.

2.2.1. Individual's background

As specified above, the individual and his/her cognitive abilities are of primary importance in understanding the extent to which he/she is able to accumulate human capital assets from investments such as experience and education (Martin, McNally, and Kay 2013; Unger et al. 2011). The learner fulfils a central role with regards to the outcomes of EE (Löbler 2006; Mueller and Anderson 2014). The stock of previous experience affects an individual's ability to transform experiences into entrepreneurial knowledge (Marvel, Davis, and Sproul 2016; Politis 2005).

Literature considers various forms of previous experiences of entrepreneurship, such as: (i) entrepreneurial experience within the family; (ii) a contact with relatives or close friends who are entrepreneurs; (iii) a work experience in a small firm; and finally, (iv) having started an own business (Peterman and Kennedy 2003). Among these, we focus on the last form as it refers to entrepreneurship experience directly accumulated by the individual and thus is more likely to represent an asset that is valuable to EL (Neck and Greene 2011; Politis 2005). Founding a business is a critical event within the EL process (Cope 2005); therefore students that have started a venture are expected to build entrepreneurial knowledge in a different way than students without such experience. In particular we expect founding experience to alter the mechanisms that determine the inflection point of EL as hypothesized above.

First, founding experience is expected to mitigate the 'diminishing return of education' mechanism hypothesized above, because it helps to better elaborate human capital investments and transform them into knowledge (Morris et al. 2012; Toft-Kehler, Wennberg, and Kim 2014). Students that have founded a business, in fact, can apply and test in their professional life what has been learnt from EE. By doing so they connect knowledge from teaching with knowledge from practice, which can serve as an additional stimulus to learn (Van de Ven and Johnson 2006). Thus the saturation point is likely to occur only at a higher exposure to EE initiatives, all else being equal.

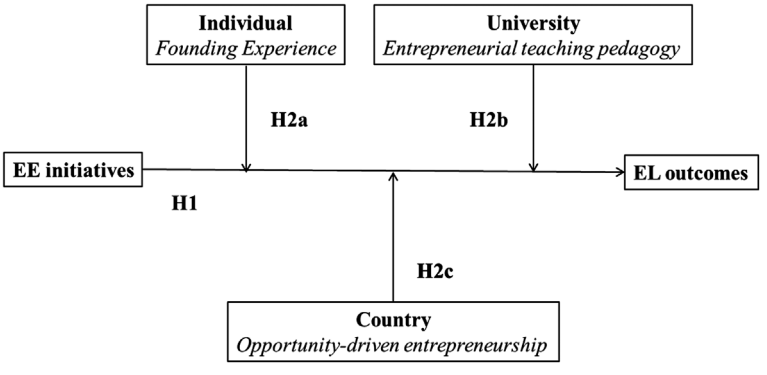

Figure 1. Conceptual framework.

The second mechanism, i.e. 'depreciation of human capital asset', should also be mitigated in students with founding experience: they are more likely to appreciate the value of EE because they can understand its application to everyday practice. All aspects discussed in the educational setting make them reflect on their own practical experiences. Indeed, entrepreneurial expertise results from an integration of explicit knowledge obtainable from education and tacit knowledge developed through founding experiences (Unger et al. 2011); when combined with the latter, the former is more effective in conferring students the ability required to take more complex decisions in managing their venture (Dutta, Li, and Merenda 2011; Martin, McNally, and Kay 2013).

Based on these considerations we formulate the following hypothesis:

Hypothesis 2a: Founding experience moderates the relationship between exposure to various EE initiatives and EL outcomes in such a way that the positive side of the inverted U-shape will become larger for students with founding experience.

2.2.2. Entrepreneurial teaching pedagogy

The effects of investments in human capital largely depend on the type of investments made (Marvel, Davis, and Sproul 2016). In the field of EE, this implies that we may expect that the features of EE programs affect the extent to which students learn from education (Martin, McNally, and Kay 2013). In particular, pedagogy has been acknowledged to be a key driver of the effectiveness of EE programs (Béchard and Grégoire 2005). Broadly speaking, EE pedagogies can be classified into 'practice-oriented' or 'theoretical-oriented' (Piperopoulos and Dimov 2015). While in the latter the student is a passive recipient of knowledge and the teacher initiates the learning process, in practice-oriented EE the student is responsible for constructing learning through experience (Gielnik et al. 2015). Rather than imparting knowledge, teachers adjust their training in relation to their students' needs (Honig 2004; Mustar 2009). Many authors have emphasized that EE should adopt a learner-centred perspective, where students are encouraged to directly experience entrepreneurship in order to learn (Béchard and Grégoire 2005; Fletcher 2007; Löbler 2006).

Through experiential learning, educators help students to develop the tacit knowledge, which entrepreneurs normally acquire from experience (Honig 2004; Walter and Dohse 2012) and that formal education may struggle to deliver (Politis 2005). To achieve this goal EE can assume a 'practice-oriented' approach aimed at recreating – in an educational setting – the context in which entrepreneurs learn (Gielnik et al. 2015). For example, simulations are designed to replicate entrepreneurial practice in the context of EE programs[1] (Pittaway and Cope 2007b). Since simulations help students to connect course contents with practical knowledge (Zantow, Knowlton, and Sharp 2005), learners are facilitated in acquiring expertise from additional EE activities. Thus we may expect that if EE is imparted mainly by adopting a 'practice-oriented approach', students will benefit from attending additional EE initiatives in a similar fashion, as do students with founding experience. Furthermore, this approach offers the opportunity to appreciate in concrete applications the value of what has been learnt (Mueller and Anderson 2014). For these reasons we may expect that a practice-oriented pedagogy will help students to better learn when they are exposed to an increasing number of EE initiatives.

Besides providing students with a surrogate of entrepreneurial experience, practice-oriented pedagogies prevent students from depreciating the stock of knowledge acquired from education. When the focus of education is mainly on imparting hard facts on business

creation, students will be more likely to perceive their knowledge as inadequate: such education is necessary to provide a general understanding of entrepreneurship phenomena, but has a lower effect on the development of the student's entrepreneurial skills and abilities. On the other hand, if the pedagogy is more practice-oriented, students will perceive to have a more complete understanding of entrepreneurship (Piperopoulos and Dimov 2015). Based on these considerations, we formulate the following hypothesis:

> *Hypothesis 2b*: Entrepreneurial teaching pedagogy moderates the relationship between the exposure to various EE initiatives and EL outcomes in such a way that the positive side of the inverted U-shape will become larger if the pedagogy is more practice-oriented rather than theoretical-oriented.

2.2.3. National entrepreneurial activity

Finally, human capital theory predicts that the competencies acquired through education are economic assets whose value is determined by the market (Becker 1964). In line with this argument it has been suggested that students' evaluation of EE benefits is affected by what they believe an entrepreneurship career requires in terms of skills and competences (Lee, Chang, and Lim 2005). Such beliefs are context-specific because they are rooted in cultural views about entrepreneurship resulting from the environment in which students are embedded (Bae et al. 2014). In particular, since cultural aspects are determined at national level, the beliefs about entrepreneurship career requirements are country-specific (Boissin et al. 2009; Carayannis, Evans, and Hanson 2003), as cross-country comparisons suggest (Giacomin et al. 2011).

Building on previous studies suggesting that the type of entrepreneurial activities, to which individuals are exposed, influences their beliefs about entrepreneurship (Kirby and Ibrahim 2011; Lee, Chang, and Lim 2005), we propose that the cultural view of entrepreneurship can be captured by the distinction between *necessity-* and *opportunity-driven* entrepreneurship. This describes what motivations and expectations most likely drive individual's entrepreneurial activities within a country (Koellinger 2008). Necessity-driven entrepreneurship is pushed by the lack of better job opportunities, while opportunity-driven entrepreneurship is pulled by perceived opportunities; the latter is frequently associated with high technology, high-growth oriented firms and is more diffused in developed, high-income countries (Hechavarria and Reynolds 2009). In these countries, students typically have as a reference point growth-oriented entrepreneurs who use to face a complex, fast-changing and uncertain environment in order to pursue an attractive business opportunity (Koellinger 2008; Levie and Autio 2008). However, the extent to which the knowledge, merely obtained by EE and without first-hand experience of industry and markets, is adequate for students to engage with environmental uncertainties is limited (Chrisman, McMullan, and Hall 2005; Honig 2004). Based on these arguments, we suggest that, in countries where opportunity-driven entrepreneurship is more diffused, students realize the limitations of the entrepreneurial knowledge acquired in the classroom more quickly, i.e. after being exposed to less EE initiatives. Therefore, for these students 'depreciation' of the EL outcomes will occur earlier. Conversely, where necessity-driven entrepreneurship is more diffused, entrepreneurial career requirements are lower and we expect the learning obtained from a given exposure to EE initiatives to be more positively evaluated.

One could argue that the diffusion of opportunity-driven entrepreneurship in a country provides students the opportunity to complement EE with the exposure to vicarious

examples of high-growth entrepreneurs who are also more likely to be involved in the classroom (Levie and Autio 2008; Walter and Dohse 2012). However, the stories and cases of entrepreneurs students are exposed to confront them also with requirements and challenges of entrepreneurship (Minniti 2005). As a consequence students might become increasingly aware of the classroom's limitations in preparing to the risks and uncertainties faced by growth-oriented entrepreneurs (Chrisman, McMullan, and Hall 2005; Honig 2004). Previous empirical evidence points in this direction (Lee, Chang, and Lim 2005). Based on these considerations we formulate the following hypothesis:

Hypothesis 2c: National entrepreneurial activity moderates the relationship between exposure to various EE initiatives and EL outcomes in such a way that the positive side of the inverted U-shape will become smaller in countries where opportunity-driven entrepreneurship is more diffused.

3. Method

3.1. Sample and procedure

The student-level data for the empirical validation of the hypotheses comes from the GUESSS[2] survey of 2011 ('Global University Entrepreneurial Spirit Students' Survey'), while the data for country entrepreneurial activity results from GEM ('Global Entrepreneurship Monitor'). The GUESSS project is coordinated at global level by the Swiss Research Institute of Small Business and Entrepreneurship at the University of St. Gallen (KMU-HSG) in Switzerland. For each participating country a representative is responsible to engage and coordinate the research amongst the universities of that country. The sample was gathered through a non-random process in which universities were autonomous in defining the breadth of classes and schools involved in the survey. Students received the questionnaire (web-based or paper-based) through social networks, email or in the classroom. The complete GUESSS data set for 2011 includes information from 93,265 respondents across 26 countries. It includes higher education students of different fields of study[3] and different education levels (e.g. undergraduate, graduate, PhD)[4] from the countries listed in Table 1. The sample of our study has already been checked for non-response bias (Bergmann, Hundt, and Sternberg 2016). We have also examined the data for missing values. 4347 out of 93,265 (about 5% of the sample) have not answered to all questions needed to build the variables of interest, which represents no serious concern. By excluding from the sample respondents for which we could not build the variables of interest, the final sample size consists of 87,918 students from 25 countries[5] at different levels of economic development and with heterogeneous institutional contexts. Whereas in their extensive meta-analytical review of the studies on EE impact Bae et al. (2014) and Martin, McNally, and Kay (2013) concluded that most of the studies have small samples, our sample can be classified as large ($N > 500$). Coupled with the variety of countries included, our research contributes to the generalizability of the obtained results (Martin, McNally, and Kay 2013).

3.2. Estimation technique

The combination of individual-level and group-level variables within a single model might be problematic since within-group individual observations are not random; this might yield biased and inefficient estimations. Since our sample is made up of individual-level

Table 1. Countries, universities and respondents of the GUESSS 2011.

Country	# of universities	# of responses
Argentina	23	1660
Austria	17	4553
Belgium	11	188
Brazil	43	28,186
Chile	5	1244
China	22	868
Estonia	21	1874
Finland	12	1437
France	17	1498
Germany	46	12,469
Greece	7	454
Hungary	23	5677
Ireland	8	332
Japan	4	561
Liechtenstein	1	220
Luxembourg	2	444
Mexico	3	556
Netherlands	56	13,121
Pakistan	12	321
Portugal	14	1020
Romania	33	849
Russia	23	2882
Singapore	8	2391
South Africa	15	697
Switzerland	44	8115
UK	19	648
TOTAL	489	93,265

observations, which are clustered within countries, we follow a multi-level mixed-effects regression approach (both random and fixed effects) (Rabe-Hesketh and Skrondal 2008). In EE, research multilevel estimation has been used for example by Walter and Dohse (2012) and Minola, Donina, and Meoli (2016) who collected individual level and regional/country level data to study EE and students' entrepreneurship.

3.3. Measures

3.3.1. Dependent variable

Our measure of *EL* is based on the conceptualization of Laukkanen (2000), who claims that the learning objectives to be achieved by EE initiatives are the provision of an appropriate *know-what* and *know-how* (Hood and Young 1993), *know-who* (Gibb 1996), and *know-why* and *know-when* (Johannisson 1991). Based on this conceptual classification of learning, Souitaris, Zerbinati, and Al-Laham (2007) developed a perceptual scale to measure learning from entrepreneurship programs and courses, which we use to examine the learning impact of university offerings. As the variable is measured at the individual level, each student has been asked the following five questions and had to answer them on a 7-point Likert scale (1 = strongly disagree 7 = strongly agree):

> The university offerings I attended (1) increased my understanding of the attitudes, values and motivation of entrepreneurs (i.e., why do entrepreneurs act?); (2) increased my understanding of the actions someone has to take in order to start a business (i.e., what needs to be done?); (3) enhanced my practical management skills in order to start a business (i.e., how do I start the venture?); (4) enhanced my ability to develop networks (i.e., who do I need to know)?; (5) enhanced my ability to identify an opportunity (i.e., when do I need to act?).

The scale proved to be reliable ($\alpha > 0.70$) and one-dimensional (all five items loaded on a single factor). One of the limitations of previous studies researching the impact of EE is the research design, that is often not fully suited to examine the causality between EE and its effect on students (Fayolle 2013). Our measure addresses this limitation by capturing the evolution of students' entrepreneurial knowledge obtained specifically *from* university.

3.3.2. Independent variable

To measure exposure to various EE initiatives, we applied the approach of Dutta, Li, and Merenda (2011)[6] and Minola, Donina, and Meoli (2016)[7], namely counting the different EE initiatives that have been attended by students. We relied upon the GUESSS survey in which 14 different EE initiatives were identified and categorized. Since the variable is measured at the individual-level, for each initiative, the respondent was asked whether he/she had attended that activity. Exposure to EE initiatives, labelled *EE*, is then calculated as the total number of various initiatives that the respondent had participated to. The university initiatives of the questionnaire belong to three categories: (i) lectures/seminars, (ii) network and coaching offerings, and (iii) provision of resources for founders/entrepreneurs. The first category covers a wide range of contents including (1) entrepreneurship in general; (2) family firms; (3) financing entrepreneurial ventures; (4) technology entrepreneurship; (5) social entrepreneurship; (6) entrepreneurial marketing; (7) innovation and idea generation; and (8) business planning. This variety of contents corresponds to a large extent to the three teaching contents identified by Walter, Parboteeah, and Walter (2013). Offerings in this first category provide students with techniques to generate and market business ideas, to develop business plans and to analyse markets, and to acquire resources and manage a new venture. The coaching and networking category refers to those industry or business context linkages and access, which are explicitly provided to students as part of the educational offering (Walter, Parboteeah, and Walter 2013). In our study we identify the following initiatives pertaining to the networking/coaching category: (1) workshops/networking with experienced entrepreneurs; (2) contact platforms with potential investors; (3) business plan contests/workshops; (4) mentoring and coaching programs for entrepreneurs; and (5) contact points for entrepreneurial issues. Finally, we have a single-item measure on efforts and resources deployed by the university in order to support the development of business ideas. In particular, students can learn about newest technological opportunities and access research resources thanks to their university affiliation (Souitaris, Zerbinati, and Al-Laham 2007; Walter, Parboteeah, and Walter 2013).

Our independent variable ranges from 0 to 14; this is because our sample also includes students who were not exposed to any EE initiative. This means that our research design and results benefit from a control group, i.e. a group of students that has not been 'treated' by EE. On the one hand, this is coherent with the literature on impact studies in general (see e.g. Origo 2009), which often employ a non-treated sample to isolate spurious effects and to have a more rigorous measure of the treatment effect, in our case EL outcomes caused by education. On the other hand, for the specific case of our work, this allows us to control for the possible impact of other types of university offerings (e.g. management or economic courses) on EL outcomes and interpreting the coefficient of our estimations as a more rigorous and correct assessment of the *net* EE effect.

3.3.3. Moderating variables

In order to measure the founding experience of students we have created the dummy individual-level variable *founder* that takes the value 1 if the respondent has founded a business before attending the university he/she was enrolled in at the time of the survey. The nature of the entrepreneurial teaching pedagogy (labelled *pedagogy*), whether theoretical- rather than practical-oriented, has been measured at the individual level by asking each student to assess on a single-item 7 points Likert scale where '1' indicated that classes or training in entrepreneurship that they have had, were mainly on imparting knowledge, while '7' indicated that students could work on own entrepreneurial ideas. At the country-level the diffusion of national opportunity-driven entrepreneurship (labelled *opportunity*) was gathered from GEM data. By interviewing a representative sample of a country's population, the GEM survey provides a reliable indicator of the diffusion of opportunity-driven entrepreneurship at national level (Bowen and De Clercq 2008; Hechavarria and Reynolds 2009; Levie and Autio 2008). For each country we have considered the average level of improvement-driven opportunity (IDO) entrepreneurship in the years 2009, 2010 and 2011 to approximate the type of entrepreneurial activity witnessed by students during the years in which they attended university. The level of IDO activity is defined as the percentage of individuals over the total the population of entrepreneurs who have started a venture to either earn more money or to be more independent.

3.3.4. Control variables

We control for a selection of individual-level influences that are often associated with entrepreneurship (Grilo and Irigoyen 2006; Grilo and Thurik 2008; Minniti and Nardone 2007; Shinnar, Pruett, and Toney 2009; Van der Zwan et al. 2013): (i) gender, (ii) age, (iii) education, (iv) field of study and (v) whether the student's parents were entrepreneurs. First, we control for *gender*, measured with a dummy where '1' indicates female and '0' male. Most studies find that men have a higher probability of engaging in entrepreneurship than women (Grilo and Thurik 2008). Indeed gender has been found to influence entrepreneurial behaviour and learning at different stages of the process (Van der Zwan et al. 2013). Second, we control for *age* measured in years, because it has been suggested that age may influence individuals' predisposition to learn (Minola, Criaco, and Cassia 2014; Wilson and McCrystal 2007). Third, we control for level of *education* of the interviewee: undergraduate (Bachelor); graduate (Master); PhD/doctorate; faculty/post doc; or MBA/Executive Education. Generic education may stimulate EL fostering opportunity recognition and improving the ability to successfully start and manage a new firm as well as grow an established business (Cope 2001). We also control for respondents' field of study. Despite the growing importance of EE in university departments focused on Social Sciences and Science/Engineering (Souitaris, Zerbinati, and Al-Laham 2007; Walter, Parboteeah, and Walter 2013), business students place more emphasis on learning about entrepreneurship (Shinnar, Pruett, and Toney 2009). In our study we grouped the field of study in four broad areas: (1) *business and economics*, (2) *natural sciences*, (3) *social sciences*, and (4) *other*. We have created a dummy variable for each study area with the exception of 'other' which has been considered as the reference category. Finally, we control for student's parent entrepreneurship using the dummy *parent,* which is equal to '1' if at least one of the individual's parents is or has been an entrepreneur ('0' otherwise). This form of exposure to entrepreneurship is suggested to affect EL (Fayolle and Gailly 2015; Walter and Dohse 2012).

4. Results

The means, standard deviations, and correlations of the variables in this study can be found in Table 2.

We standardized all interaction variables to reduce multicollinearity problems. We also checked for multicollinearity by examining the variance inflation factors (VIFs). All of the VIF values remain below 5, indicating that multicollinearity is not a problem in our analyses (Kennedy 2008). The results from our main regression analyses can be found in Table 3 (panel A and B). The parameters of fit of all models can be found in Table 4.

Model 1 contains all control variables. All entered variables show significant coefficients and the Wald χ^2 statistic also shows significance of the model (see Table 4). Specifically, the coefficient of *Age* is negative and significant, supporting the idea that the effect on EL outcomes is stronger for younger students. The coefficient of gender is also negative and significant, suggesting that male students report better EL outcomes than females. The positive and significant coefficient of education suggests that students at a higher level of general education have developed more entrepreneurial knowledge (Cope 2001). All coefficients of the field of study dummies are significant, but only the one associated to business and economics is positive.[8] The coefficient of *parent* is positive and significant, suggesting that students whose parents are (or have been) entrepreneurs report more positive perceptions of their EL outcomes.

In model 2, the coefficient of the independent variable EE is significantly positive ($\beta = 0.546, p < 0.01$). However as we hypothesized a curvilinear relationship between EE and EL outcomes, model 3 also contains the quadratic term of EE. The coefficient of EE is significantly positive ($\beta = 0.693, p < 0.01$) and the coefficient of the quadratic term is significantly negative ($\beta = -0.096, p < 0.01$). Hence, our results suggest the existence of an inverted U-shaped relationship between EE and EL outcomes, providing support for Hypothesis 1. Figure 2 provides a graphical representation for this relationship. Both in Models 2 and 3, the coefficient of the control variable *education* turns non-significant.

In model 4 all moderating variables are added. The interaction term EE × founder, added in model 5 shows a negative but insignificant coefficient. In model 6, the product between EE squared and founding experience is entered. The coefficient of this interaction term is positive and marginally significant ($\beta = 0.035, p < 0.1$). This result is in support of Hypothesis 2a, proposing that founding experience moderates the relationship between exposure to EE initiatives and EL outcomes. To better interpret this result, Figure 3 shows a graphical representation of the curvilinear relation between EE and EL outcomes for students with and without founding experience.

As shown in Figure 3, the dotted line, representing the relationship for students with founding experience, becomes wider and has a higher peak compared to the full line, which represents the relationship for students with no founding experience. The figure suggests that the relationship between EE and EL is less strong for students with founding experience compared to those without this experience at when they are exposed to less EE initiatives. However, students with founding experience are in the condition to achieve higher levels of entrepreneurial knowledge when they attend additional EE initiatives.

Model 7 (Table 3, panel B) includes all control variables, all moderators, the independent variable EE, EE squared and the interaction term EE x pedagogy. The coefficient of this interaction term is negative and significant ($\beta = -0.121, p < 0.01$). This result provides already

Table 2. Descriptive statistics and correlations.

Variable	Mean	Std. Dev.	1	2	3	4	5	6	7	8	9	10	11
1. EL	4.143	1.516											
2. EE	2.761	3.062	0.443**										
3. Age	25.104	6.257	−0.033**	−0.027**									
4. Gender	0.551	0.497	−0.060**	−0.067**	−0.064**								
5. Education	0.301	0.716	−0.040**	−0.018**	0.247**	−0.015**							
6. Social sciences	0.153	0.360	−0.173**	−0.161**	0.042**	0.152**	0.037**						
7. Business economics	0.297	0.457	0.258**	0.301**	−0.056**	−0.005	−0.001	−0.276**					
8. Natural sciences	0.327	0.469	−0.115**	−0.138**	−0.016**	−0.167**	0.008*	−0.296**	−0.453**				
9. Parent	0.455	0.498	0.077**	0.092**	−0.011**	−0.018**	−0.031**	−0.044**	0.034**	−0.016**			
10. Founder	0.022	0.148	0.008*	0.009**	0.128**	−0.052**	0.033**	−0.011**	0.009**	−0.011**	0.031**		
11. Pedagogy	3.668	1.836	0.594**	0.348**	−0.031**	−0.041**	−0.039**	−0.106**	0.150**	−0.062**	0.063**	0.014**	
12. Opportunity	50.532	8.135	−0.136**	−0.050**	−0.012**	−0.007*	0.106**	0.111**	0.006	−0.074**	−0.067**	−0.023**	−0.101**

$N = 87{,}918$.
*$p < 0.05$; **$p < 0.01$.

Table 3. Main regression analyses.

Panel A

Dependent variable: EL

Independent variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Age	−0.009*** (0.001)	−0.007*** (0.001)	−0.007*** (0.001)	−0.004*** (0.001)	−0.004*** (0.001)	−0.004*** (0.001)
Gender	−0.169*** (0.010)	−0.098*** (0.010)	−0.098*** (0.010)	−0.070*** (0.008)	−0.071*** (0.008)	−0.071*** (0.008)
Education	0.016** (0.007)	0.010 (0.007)	0.010 (0.007)	0.014** (0.006)	0.014** (0.006)	0.014** (0.006)
Social science[a]	−0.414*** (0.016)	−0.303*** (0.015)	−0.282*** (0.015)	−0.242*** (0.013)	−0.242*** (0.013)	−0.242*** (0.013)
Business economics[a]	0.617*** (0.014)	0.336*** (0.013)	0.300*** (0.013)	0.246*** (0.011)	0.246*** (0.011)	0.246*** (0.011)
Natural science[a]	−0.238*** (0.013)	−0.172*** (0.012)	−0.165*** (0.012)	−0.140*** (0.011)	−0.140*** (0.011)	−0.140*** (0.011)
Parent	0.076*** (0.010)	0.024*** (0.009)	0.016* (0.009)	0.007 (0.008)	0.007 (0.008)	0.007 (0.008)
EE		0.546*** (0.005)	0.693*** (0.007)	0.461*** (0.006)	0.462*** (0.006)	0.463*** (0.006)
EE squared			−0.096*** (0.003)	−0.085*** (0.003)	−0.085*** (0.003)	−0.086*** (0.003)
Founder				−0.035 (0.036)	−0.035 (0.036)	−0.035 (0.036)
Opportunity				−0.022 (0.026)	−0.021 (0.026)	−0.059* (0.033)
Pedagogy				0.725*** (0.004)	0.725*** (0.004)	0.725*** (0.004)
EE × founder					−0.012 (0.023)	−0.067* (0.037)
EE squared × founder						0.035* (0.018)
Constant	4.424*** (0.080)	4.350*** (0.065)	4.433*** (0.064)	4.327*** (0.048)	4.327*** (0.048)	4.328*** (0.048)
Variance of the random intercept	0.377 (0.054)	0.300 (0.044)	0.296 (0.043)	−0.212 (0.032)	0.212 (0.032)	0.212 (0.031)

Panel B

Dependent variable: EL

Independent variables	Model 7	Model 8	Model 9	Model 10
Age	−0.004*** (0.001)	−0.003*** (0.001)	−0.004*** (0.001)	−0.004*** (0.001)
Gender	−0.066*** (0.008)	−0.065*** (0.008)	−0.068*** (0.008)	−0.068*** (0.008)
Education	0.015*** (0.006)	0.015*** (0.006)	0.014** (0.006)	0.015*** (0.006)
Social science[a]	−0.233*** (0.013)	−0.221*** (0.013)	−0.235*** (0.013)	−0.234*** (0.013)
Business economics[a]	0.243*** (0.011)	0.239*** (0.011)	0.245*** (0.011)	0.246*** (0.011)
Natural science[a]	−0.138*** (0.011)	−0.138*** (0.010)	−0.138*** (0.011)	−0.138*** (0.011)
Parent	0.008 (0.008)	0.008 (0.008)	0.007 (0.008)	0.007 (0.008)
EE	0.467*** (0.006)	0.495*** (0.006)	0.461*** (0.006)	0.462*** (0.006)
EE squared	−0.049*** (0.003)	−0.123*** (0.004)	−0.081*** (0.003)	−0.085*** (0.003)
Founder	−0.031 (0.037)	−0.031 (0.036)	−0.043 (0.035)	−0.018 (0.035)
Opportunity	−0.021 (0.026)	−0.028 (0.026)	−0.027 (0.026)	−0.026 (0.026)
Pedagogy	0.723*** (0.004)	0.608*** (0.005)	0.724*** (0.004)	0.724*** (0.004)
EE × pedagogy	−0.121*** (0.004)	−0.283*** (0.006)		
EE squared × pedagogy		0.126*** (0.003)		
EE × opportunity			0.053*** (0.004)	0.089*** (0.005)
EE squared × opportunity				−0.027*** (0.003)
Constant	4.319*** (0.049)	4.377*** (0.048)	4.325*** (0.047)	4.329*** (0.047)
Variance of the random intercept	0.218 (0.032)	0.211 (0.031)	0.206 (0.031)	0.206 (0.031)

Notes: $N = 87{,}918$, number of groups = 25.
Standard errors in parentheses.
***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.
[a]'others' is the suppressed comparison category.

Table 4. Parameters of fit.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Log likelihood	−154622	−148630	−148235	−135028	−135028	−135026	−134628	−133738	−134942	−134904
Wald χ^2	7203***	21099***	22082***	60645***	60645***	60651***	62001***	65070***	60939***	61068***
LR test vs. linear regression χ^{2a}	5237.13***	3220.82***	3222.26***	1154.74***	1154.56***	1154.36***	1180.37***	1179.54***	1141.76***	1151.47***
LR test of model fit: χ^{2b}	6922.62***	11985.6***	789.12***	26413.58***	0.24	3.64*	800.82***	1780.5***	172.41***	76.32***
Error variance	1.970	1.719	1.704	1.262	1.262	1.262	1.251	1.225	1.260	1.258
R^2	0.076	0.194	0.201	0.408	0.408	0.408	0.413	0.425	0.409	0.410

Note: $N = 87{,}918$.

*$p < 0.1$; ***$p < 0.01$; [a]Statistical significance confirms that the country-level variance component is important.

[b]LR test performed between Models n and $n - 1$ using maximum-likelihood estimates (MLE). Statistical significance confirms that model n adds explanatory power to model $n - 1$. Note that models 5, 7 and 9 are compared to model 4 and model 1 is compared to the null model.

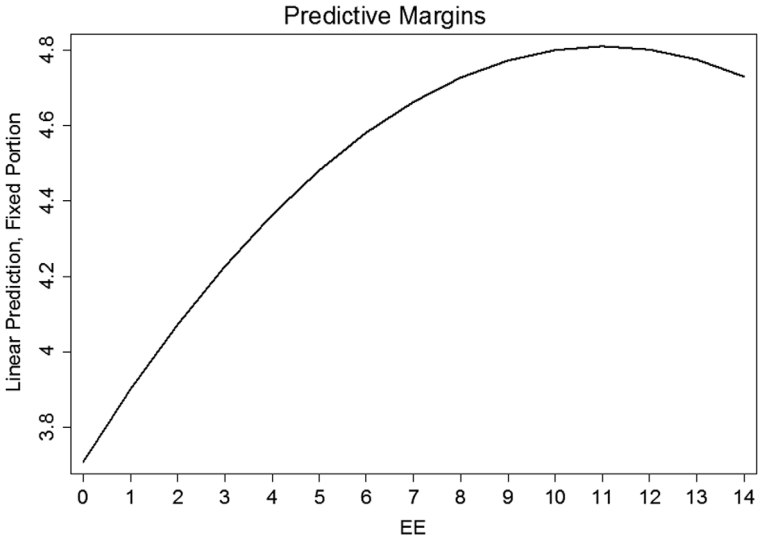

Figure 2. The effect of exposure to entrepreneurship education initiatives on entrepreneurial learning outcomes.

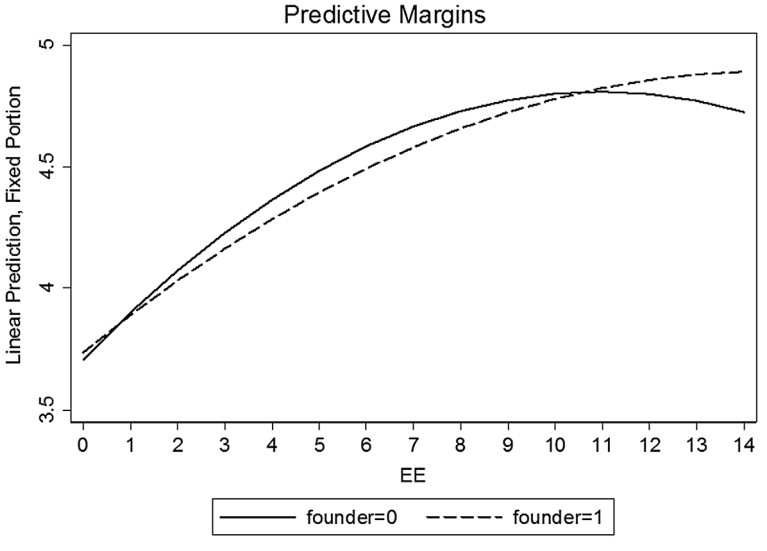

Figure 3. The effect of exposure to entrepreneurship education initiatives on entrepreneurial learning outcomes for students with and without founding experience.

some indication of a moderating effect of the entrepreneurial teaching pedagogy on the relationship between EE and EL. However, to test for a curvilinear moderating effect, as is proposed in Hypothesis 2b, the introduction of the interaction between EE squared and pedagogy to the model is needed. Hence, in the next step, model 8 additionally includes the EE squared x pedagogy interaction term. The coefficient of this variable is significant and positive which is in line with Hypothesis 2b ($\beta = 0.126$, $p < 0.01$). Figure 4 shows a

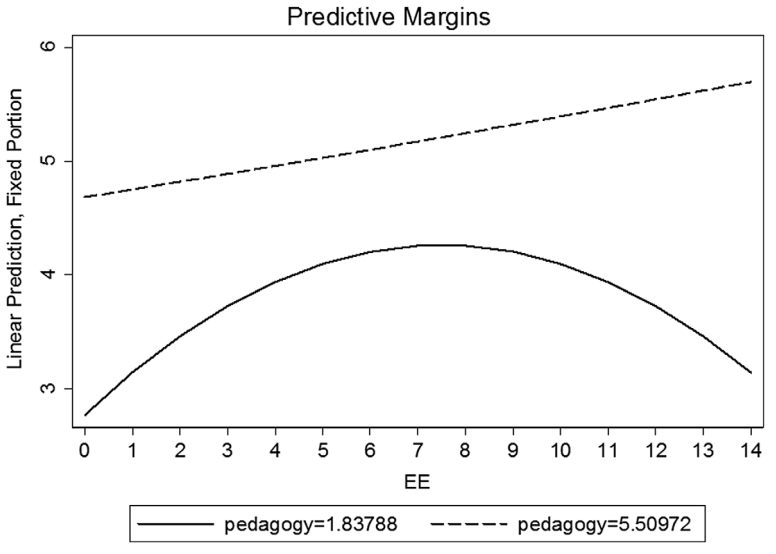

Figure 4. The effect of exposure to entrepreneurship education initiatives on entrepreneurial learning outcomes for different levels of practical-oriented teaching pedagogy.

graphical representation of the relationship between the amount of EE initiatives and EL outcomes for both high and low levels of a practical teaching pedagogy.

The dotted line represents the relationship between EE and EL for a high degree of practice-oriented teaching, whereas the full line represents a low degree of practice-oriented pedagogy. As proposed in Hypothesis 2b, when the entrepreneurial teaching pedagogy is more practice-oriented, the interval of EE in which the inverted U-shaped curve is positive becomes larger and the maximum amount of EL outcomes that can be reached increases. Moreover, as the dotted line is situated above the full line for the entire range of EE, EL outcomes are always higher when a practice-oriented entrepreneurial teaching pedagogy is used. In addition, when considering the full range of EE, the curvilinear relationship with practical-oriented pedagogy gets closer to a linear, positive and monotonic one; while for the case of a more theoretical-oriented pedagogy the curvilinear effect remains.

Model 9 includes all control variables, the independent variable EE, all moderators and the interaction term EE x opportunity. The coefficient of the interaction term is positive and significant ($\beta = 0.053$, $p < 0.01$). As indicated before, this result only provides support for a linear moderating effect, whereas we want to test a curvilinear moderating effect. Therefore, model 10 introduces the interaction term EE squared x opportunity. The coefficient of this interaction term is significantly negative ($\beta = -0.027$, $p < 0.01$), which provides support for Hypotheses 2c. To better interpret this result, a graphical representation of the relationship between exposure to various EE initiatives and EL outcomes for different levels of opportunity entrepreneurship is provided in Figure 5.

The dotted line represents the relationship between exposure to EE initiatives and EL outcomes in countries where opportunity-driven entrepreneurship is more diffused, whereas the full line shows this relationship for countries with lower levels of opportunity-driven entrepreneurship. As the dotted line is narrower compared to the full, the maximum level of EL outcomes is reached sooner in countries where high opportunity-driven

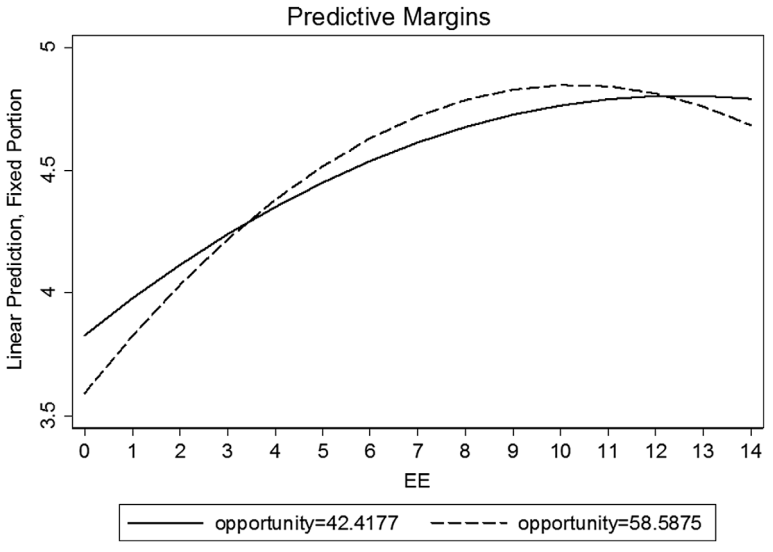

Figure 5. The effect of exposure to entrepreneurship education initiatives on entrepreneurial learning outcomes for different national levels of opportunity-driven entrepreneurship.

entrepreneurship is more diffused. That is, when students are educated in such context, they will reach their maximum EL outcomes after attending a lower number of EE initiatives, making additional EE less effective. This result provides support for Hypothesis 2c.

Table 4 shows significant Wald χ^2 for all models of our analyses. Additionally, Table 4 includes the results from the likelihood ratio (LR) comparing the fitted mixed models to standard regressions with no group-level random effects. As the tests are significant for all models, we can reject the null-hypotheses that all random-effects parameters of the mixed models are equal to 0. The next row in Table 4 shows the results of the LR test of model fit. Comparing models n to models $n-1$ suggests that the variables added in each step improve the explanatory power of the models ($p < 0.01$). Only for model 5, in which the interaction term EE × founder is entered, the test becomes not significant, but in model 6, which includes also the quadratic interaction term EE squared × founder, the test turns marginally significant. This serves as an indication that contributes to rule out possible issues related to small effect size in large samples (Combs 2010). Testing alternatives to the multi-level mixed-effects regression models can serve as additional robustness tests; we therefore run a linear regression without considering the fact that data are country-clustered, and introducing country dummies. The results remained stable. Finally, we also run our models for two sub-samples (in particular the first sub-sample was identified by including only students whose level of EE was between 1 and 14, while for the second EE was equal to 8 or higher. This verifies the robustness with respect to the non-normal distribution of our independent variable. Again, our results did not differ.

5. Discussion

5.1. Theoretical contributions

Our work contributes to the fields of research on entrepreneurship, EE and EL by showing to what extent and under which circumstances exposing students to an increasing number

of EE initiatives supports them in developing entrepreneurial knowledge. Through the lenses of human capital theory, our findings illustrate that the relationship between the amount of attended EE initiatives and EL outcomes is curvilinear; students learn from additional exposure to EE initiatives until a certain threshold level is reached. Behind this point the learning resulting from education decreases. Moreover, this inverted U-shaped relationship is moderated by three contingent factors. Having previous founding experience strengthens students' EL from EE, retarding the point at which the EE–EL relationship turns negative. Furthermore, the level of EL outcomes achieved by students is consistently higher and grows monotonically when universities use a more practical-oriented rather than theoretical-oriented pedagogy. Finally, also entrepreneurial activity in a country has an impact on the EE–EL relationship, as in nations where opportunity-driven entrepreneurship is more diffused, students' EL outcomes start declining sooner, i.e. when students are exposed to a lower number of EE initiatives.

The results relative to our control variables extend and reinforce our understanding on the determinants of EL outcomes at university. In line with earlier evidence documented by Minola, Criaco, and Cassia (2014) suggesting that the plasticity of individual cognition is higher at very young age, we found that younger students are more predisposed to EL. Alternatively, the effect could be (partly) ascribed to the tendency of younger students to overestimate their EL outcomes due to higher levels of optimism and self-assessment (You, Fung, and Isaacowitz 2009). Male students attribute more value to their EL outcomes possibly because they tend to be more self-confident about their entrepreneurial skills (Minniti and Nardone 2007). The positive impact of the level of general education on EL outcomes suggests that education may enhance the cognitive skills to recognize and act on opportunities (Cope 2001). Concerning field of study, our results suggest that traditional business and economics education, though distinct from EE, provides some forms of entrepreneurial knowledge (Haase and Lautenschläger 2011). Finally, we discover that students whose parents are (or have been) entrepreneurs report more positive perceptions of their EL outcomes. A common explanation is that students grown up in a family of entrepreneurs are more predisposed to entrepreneurship (Peterman and Kennedy 2003).

Our work offers three main contributions to theory and research. First, the paper extends our knowledge on the complex process of EL by conceptualizing and testing its antecedents and moderators in an educational context. Previous studies have highlighted that individuals develop the broad set of values, motivations and competencies to act entrepreneurially in the course of their entire life (Aldrich and Yang 2014; Harvey and Evans 1995) and that education can play an important role in such process (Unger et al. 2011). Building on this literature, our study focuses on students' educational experiences at university and explores more in depth the mechanisms and conditions under which students can actually engage in the EL process. Extending this literature, our study confirms that EL can occur even before actual engagement in entrepreneurship as a profession. By advancing our understanding of the transformation of experience into knowledge, a central issue of EL theorizing (Politis 2005), this research also contributes to human capital theory applied to the field of entrepreneurship. We illustrate that investment in human capital, represented in this study by EE, can result in human capital assets, or entrepreneurial knowledge (EL outcome) and we highlight the conditions under which this occurs.

Second, our work also provides theoretically grounded and empirically robust evidence contributing to the vivid debate on the 'teachability' of entrepreneurship (Haase and

Lautenschläger 2011; Neck and Greene 2011) that discusses the possibility of achieving EL outcomes through exposure to EE. We extend previous research on the topic by offering a more nuanced view on the impact of EE on students' EL outcomes. Indeed, exposure to various EE initiatives helps students to develop entrepreneurial knowledge, but to realize its full potential EE needs to be complemented with practical experience, acquired by students either during prior entrepreneurial efforts or through practical-oriented EE activities. Moreover, we suggest that EE is valuable as it enriches students' human capital, but also encourages them to critically reflect about their acquired entrepreneurial knowledge, its value, limitations and adequacy to the perceived needs.

Finally, by illustrating the significant impact of three contingent factors at individual-, university-, and country-level of analysis, this research effort confirms the value of multilevel research in the field of entrepreneurship (Autio, Pathak, and Wennberg 2013; Walter and Dohse 2012). The conceptualization and testing of micro-, meso- and macro-level moderators provide a higher explanatory power to our baseline empirical model, resulting in more fine-grained understanding of the EE–EL relationship.

5.2. Practical implications

Our work offers four main practical implications for the design and assessment of EE offerings at universities. First, based on the main conclusions of this study suggesting that the marginal increase of entrepreneurial knowledge due to additional EE initiatives is not constant and that it is shaped by contingent factors, we overall recommend to monitor the design of the amount of entrepreneurship topics or classes offered to students and complement it with the evaluation of their EL outcomes on a regular basis. To do this, educators could introduce learning portfolios or personal development plans (PDP) to their students. A PDP is a written or electronic record that has to be developed by the students to provide evidence of the acquisition of skills, knowledge and competencies (Brown 1995; Redman 1994). Research has illustrated that introducing these plans can help people to learn better (Beausaert, Segers, and Gijselaers 2011). At the same time, it would make it easier to track the development of the competencies needed to develop the entrepreneurial mindset (Toutain and Fayolle 2008).

Second, our results confirm earlier suggestions of Pittaway and Thorpe (2012), indicating that the individual learning response to a course might differ depending on the individual's stock of entrepreneurial experience. The possibility to offer more flexible curricula adapted to students' prior experience would be a way to take advantage of these differences. For example, one could think about mechanisms to incentivize students with some entrepreneurial experience to take additional courses, as these students are particularly prepared to benefit from them. Practical ways to get them engaged into additional courses would be to allow them to take entrepreneurship classes from other curricula or to link other classes in their curriculum, for example through exams, project works or case studies, to their experience as entrepreneur.

Third, by pointing out that EE produces higher EL outcomes when it is imparted through a practical-oriented pedagogy, our study supports the recommendations made by previous research (e.g. Neck and Greene 2011) to provide students with some forms of entrepreneurial experiences as part of the educational offering (e.g. business simulation, games, or fieldwork). Problem-based learning and learning experiences attached to business internships in entrepreneurial firms could also be offered as an additional option to the traditional apprenticeship

offered to students. The role of the teacher can be regarded in a different way, too: our work encourages instructors to provide more space for active experiences and reflection, rather than simply passing on information (Mueller and Anderson 2014). However, even though innovative and participative pedagogies are fascinating, university managers should be aware that implementing such pedagogy requires additional resources (e.g. cultural and institutional changes, new programs implementation, more skilled instructors, coordination mechanisms, costs to organize events and business plan competitions). Given that the situation of higher education institutions is characterized by scarcity of resources and changing legislative contexts, especially in Europe, educators, university managers and policymakers should carefully consider the trade-off between investment and cost saving related to important aspects such as the development of students' entrepreneurial knowledge.

Finally, by showing that students in countries with lower levels of opportunity entrepreneurship find it more beneficial to attend additional EE initiatives, our results support the suggestions advanced by Meccheri and Pelloni (2006) who recommend EE as a vehicle to overcome the scarce learning opportunities in less developed regions with low endowments of entrepreneurship capital. At the same time, in countries with higher levels of opportunity entrepreneurship, universities should even more carefully consider the extent to which EE is actually transforming into positive EL outcomes and be more prepared to integrate traditional EE with advanced educational tools and innovative pedagogies.

On a lesser note, the positive perceptions of younger students about acquired entrepreneurial competencies endorses the implementation of EE activities also at lower level of studies (e.g. bachelor) where students are more predisposed to learn. Educators could implement some mechanisms to address the low self-confidence of female students about their acquired entrepreneurial knowledge. For example, the involvement of female entrepreneurs as positive role models in EE offerings (e.g. keynotes) could enhance the self-confidence of female students. The lower level of EL outcomes reported by students in natural and social sciences areas compared to business and economics students points out that imparting additional EE initiatives may be particularly urgent to technical and humanistic faculties. While in business and economics faculties business knowledge is conveyed through other courses, in other faculties EE may represent the only possibility for students to acquire entrepreneurial knowledge. Providing entrepreneurial knowledge to students with scientific and technical competencies is important because they often lack the business skills to turn their ideas in viable businesses (Mustar 2009; Shinnar, Pruett and Toney 2009).

5.3. Limitations and future research directions

This works opens an avenue for future research suggesting that besides growing students' entrepreneurial knowledge, EE may encourage students to realize the limitations of the acquired knowledge and that much still has to be learnt. This may constitute a form of 'higher order learning', a particular form of learning that occurs when the individual questions the 'underlying assumptions and values that guide one's actions' (Cope 2005, 382), revises his/her convictions and is motivated to further learning. We invite future research to explore more in depth the implications of such reflection on students' cognition and, in turn, their threshold of learning. To that purpose we recommend the use of qualitative studies as empirical research approach coupled with a constructivist theoretical lens (e.g. Mueller and Anderson 2014). This type of work has been shown to provide a fine-grained description on

the evolution of students' beliefs and assumptions. Overall, to overcome the limitations of cross-sectional works like ours, research would benefit from more longitudinal studies that can monitor the consequences of EL outcomes on an individual's professional life: as an entrepreneur or as employee in an entrepreneurial firm. It would be of particular interest to examine to which extent EE effects persist over time or how much time it takes until these outcomes become manifest. How long does it take for students that attended EE to start entrepreneurial activities if they opt for a career as an entrepreneur and why? In what circumstances do they prefer to delay entrepreneurial activities and to first gain experience working in their parents' business or being an employee elsewhere before starting their own business? Could EE encourage them in delaying entrepreneurial activities, based on a critical reflection of the obtained entrepreneurial competencies?

A second limitation of this study is related to the measurement of exposure to EE, operationalized as the count of the various entrepreneurial initiatives attended by students. Having further information about the EE process (e.g. knowing the overall number of hours taken by each student) would allow some robustness tests on the validity of this measure. While our proxy adds some information compared to previous studies on the impact of EE, in which this variable is often operationalized with a dichotomous variable (see Naia et al. 2014 for a review), future research could use more elaborated measures of EE (e.g. weighing each offering by number of credits attached). Furthermore, we did not have the possibility to distinguish between mandatory and elective entrepreneurship offerings or the diversity of offerings; future research should control for these choices, as it might impact the perceived learning outcomes of the students (Rauch and Hulsink 2015).

More in general, albeit survey data provides the possibility to test our research hypotheses on a huge and unique multi-country sample, there are some limitations to using this type of data. For example, more fine-grained information on the university offerings attended by students could allow researchers to control for social and team-based learning as important means to acquire entrepreneurial knowledge (Pittaway and Cope 2007b). Even though entrepreneurship and EL are social and often-team based processes, in particular when considering practice-oriented pedagogy, we do not explicitly control for this in our study. Moreover while we measured the diffusion of opportunity entrepreneurship at country level we acknowledge that having data at the regional level would provide a more fine-grained understanding on the implications of contextual factors on EE impacts (Dodd and Hynes 2012; Leitch, Hazlett, and Pittaway 2012). To address this limitation, future studies could include information about the proximity of university to business incubators or accelerators, a natural environment that nurtures growth-oriented and innovative entrepreneurs.

Finally, a more nuanced view of EE could derive from a configurational view of the EE contribution to EL. For example, as suggested by Fayolle (2013), we still lack sufficient knowledge about the best fit between methods and audiences. A three-way interaction between EE, pedagogy and founding experience could be interesting to further discuss the effect of practical pedagogy. In a similar vein, Walter and Dohse (2012) argued that pedagogy should be matched to the contextual level of entrepreneurial activity.

6. Conclusion

This study acknowledges that students are able to develop entrepreneurial knowledge through EE but only to a certain extent. Human capital theory allows us to predict and

interpret this limit, through the mechanisms of saturation and depreciation of human capital asset. This approach also suggests that the extent to which EE produces these outcomes is contingent on their entrepreneurial experience, the pedagogy of EE and the national context. These results contribute to the conceptualization of EL antecedents, moderators and outcomes in the context of EE; they also offer a set of practical implications for the design and assessment of EE programs and open avenues for future research on EL and EE.

Notes

1. Simulations are those educational activities that recreate some of the following aspects of the entrepreneurial process (Pittaway and Cope 2007b): financial and emotional exposure; action-orientation and proactive behaviour; discontinuities, events, crisis, failure; social situated learning; applying learning to new problems. One way to implement simulations is for example through new venture planning sessions where students are put in the situation to plan and experience most aspects of the venturing process. Also games, business plan competitions and other types of problem-based or social learning educational tools serve the purpose of simulating entrepreneurial practice.
2. Full description of the GUESSS project is available at the website www.guesssurvey.org. Some works based on the GUESSS project have already been published in entrepreneurship journals: see for example Sieger and Monsen (2015), Sieger and Minola (2016), Zellweger, Sieger, and Halter (2011).
3. 39% study in Business and Economics, 42% In Natural Sciences, 19% in Social Sciences.
4. On average 79% undergraduate students, 17% graduate students, the remaining 4% PhD or other.
5. National data for the variables of interest were not available in the GEM database for Liechtenstein.
6. Dutta, Li, and Merenda (2011) study to what extent additional entrepreneurial activities offered to students enhance their likelihood to become entrepreneurs and to generate wealth. To that purpose they operationalize *Specialized Entrepreneurial Education* as the count of eight different types of specialized EE activities experienced by students.
7. Like in the present article, Minola, Donina, and Meoli (2016) operationalize EE as the count of 14 different initiatives offered to students to investigate the effects on students' entrepreneurial behaviour.
8. A positive sign of the dummy indicates an higher predicted level of the dependent variable for the observations where the dummy takes the value of 1 with respect to the reference category.

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References

Aldrich, H. E., and T. Yang. 2014. "How Do Entrepreneurs Know What To Do? Learning and Organizing in New Ventures." *Journal of Evolutionary Economics* 24 (1): 59–82.

Audretsch, D. B. 2007. *The Entrepreneurial Society*. Oxford: Oxford University Press.

Audretsch, D. B. 2014. "From the Entrepreneurial University to the University for the Entrepreneurial Society." *The Journal of Technology Transfer* 39 (3): 313–321.

Autio, E., S. Pathak, and K. Wennberg. 2013. "Consequences of Cultural Practices for Entrepreneurial Behaviors." *Journal of International Business Studies* 44 (4): 334–362.

Bae, T. J., S. Qian, C. Miao, and J. Fiet. 2014. "The Relationship Between Entrepreneurship Education and Entrepreneurial Intentions: A Meta-analytic Review." *Entrepreneurship Theory and Practice* 38 (2): 217–254.

Beausaert, S., M. Segers, and W. Gijselaers. 2011. "The Use of a Personal Development Plan and the Undertaking of Learning Activities, Expertise-growth, Flexibility and Performance: The Role of Supporting Assessment Conditions." *Human Resource Development International* 14 (5): 527–543.

Becker, G. 1964. *Human Capital*. New York: Columbia University Press.

Béchard, J. P., and D. Grégoire. 2005. "Entrepreneurship Education Research Revisited: The Case of Higher Education." *Academy of Management Learning and Education* 4 (1): 22–43.

Bergmann, H., C. Hundt, and R. Sternberg. 2016. "What Makes Student Entrepreneurs? On the Relevance (and Irrelevance) of the University and the Regional Context for Student Start-ups." *Small Business Economics* 47 (1): 53–76.

Boissin, J. P., B. Branchet, S. Emin, and J. I. Herbert. 2009. "Students and Entrepreneurship: A Comparative Study of France and the United States." *Journal of Small Business & Entrepreneurship* 22 (2): 101–122.

Bowen, H. P., and D. De Clercq. 2008. "Institutional Context and the Allocation of Entrepreneurial Effort." *Journal of International Business Studies* 39 (4): 747–767.

Brown, R. 1995. *Portfolio Development and Profiling for Nurses*. 2nd ed. Lancaster: Quay Publications.

Carayannis, E. G., D. Evans, and M. Hanson. 2003. "A Cross-cultural Learning Strategy for Entrepreneurship Education: Outline of Key Concepts and Lessons Learned from a Comparative Study of Entrepreneurship Students in France and the US." *Technovation* 23 (9): 757–771.

Chrisman, J. J., E. McMullan, and J. Hall. 2005. "The Influence of Guided Preparation on the Long-term Performance of New Ventures." *Journal of Business Venturing* 20 (6): 769–791.

Combs, J. G. 2010. "Big Samples and Small Effects: Let's Not Trade Relevance and Rigor for Power." *Academy of Management Journal* 53 (1): 9–13.

Commission, E. 2008. *Entrepreneurship in Higher Education, Especially Within Non-business Studies: Final Report of the Expert Group*. Brussels: The Commission.

Cope, J. 2001. "The Entrepreneurial Experience: Towards a Dynamic Learning Perspective of Entrepreneurship." Doctoral diss., University of Lancaster.

Cope, J. 2005. "Toward a Dynamic Learning Perspective of Entrepreneurship." *Entrepreneurship Theory and Practice* 29 (4): 373–397.

De Grip, A., and J. Van Loo. 2002. "The Economics of Skills Obsolescence: A Review." *Research in Labor Economics* 21: 1–26.

DeTienne, D. R., and G. N. Chandler. 2004. "Opportunity Identification and Its Role in the Entrepreneurial Classroom: A Pedagogical Approach and Empirical Test." *Academy of Management Learning & Education* 3: 242–257.

Dodd, S. D., and B. C. Hynes. 2012. "The Impact of Regional Entrepreneurial Contexts Upon Enterprise Education." *Entrepreneurship and Regional Development* 24 (9–10): 741–766.

Dutta, D. K., J. Li, and M. Merenda. 2011. "Fostering Entrepreneurship: Impact of Specialization and Diversity in Education." *International Entrepreneurship and Management Journal* 7 (2): 163–179.

Edelman, L. F., T. S. Manolova, and C. G. Brush. 2008. "Entrepreneurship Education: Correspondence Between Practices of Nascent Entrepreneurs and Textbook Prescriptions for Success." *Academy of Management Learning and Education* 7 (1): 56–70.

Fayolle, A. 2013. "Personal Views on the Future of Entrepreneurship Education." *Entrepreneurship and Regional Development* 25 (7–8): 692–701.

Fayolle, A., and B. Gailly. 2015. "The Impact of Entrepreneurship Education on Entrepreneurial Attitudes and Intention: Hysteresis and Persistence." *Journal of Small Business Management* 53 (1): 75–93.
Fayolle, A., B. Gailly, and N. Lassas-Clerc. 2006. "Assessing the Impact of Entrepreneurship Education Programmes: A New Methodology." *Journal of European Industrial Training* 30 (9): 701–720.
Fletcher, D. 2007. "Social Constructionist Thinking: Some Implications for Entrepreneurship Research and Education." In *Handbook of Research in Entrepreneurship Education: A General Perspective*. Vol. 1, edited by A. Fayolle, 160–172. Cheltenham: Edward Elgar Publishing.
Giacomin, O., F. Janssen, M. Pruett, R. S. Shinnar, F. Llopis, and B. Toney. 2011. "Entrepreneurial Intentions, Motivations and Barriers: Differences Among American, Asian and European Students." *International Entrepreneurship and Management Journal* 7 (2): 219–238.
Gibb, A. A. 1996. "Entrepreneurship and Small Business Management: Can We Afford to Neglect Them in the Twenty-first Century Business School?" *British Journal of Management* 7 (4): 309–321.
Gielnik, M. M., M. Frese, A. Kahara-Kawuki, I. W. Katono, S. Kyejjusa, M. Ngoma, J. Munene, et al. 2015. "Action and Action-regulation in Entrepreneurship: Evaluating a Student Training for Promoting Entrepreneurship." *Academy of Management Learning & Education* 14 (1): 69–94.
von Graevenitz, G., D. Harhoff, and R. Weber. 2010. "The Effects of Entrepreneurship Education." *Journal of Economic Behavior and Organization* 76 (1): 90–112.
Grilo, I., and J. M. Irigoyen. 2006. "Entrepreneurship in the EU: To Wish and Not To Be." *Small Business Economics* 26 (4): 305–318.
Grilo, I., and R. Thurik. 2008. "Determinants of Entrepreneurial Engagement Levels in Europe and the US." *Industrial and Corporate Change* 17 (6): 1113–1145.
Guerrero, M., J. A. Cunningham, and D. Urbano. 2015. "Economic Impact of Entrepreneurial Universities' Activities: An Exploratory Study of the United Kingdom." *Research Policy* 44 (3): 748–764.
Haase, H., and A. Lautenschläger. 2011. "The 'Teachability Dilemma' of entrepreneurship." *International Entrepreneurship and Management Journal* 7 (2): 145–162.
Harvey, M., and R. Evans. 1995. "Strategic Windows in the Entrepreneurial Process." *Journal of Business Venturing* 10 (5): 331–347.
Haynie, J. M., D. Shepherd, E. Mosakowski, and P. C. Earley. 2010. "A Situated Metacognitive Model of the Entrepreneurial Mindset." *Journal of Business Venturing* 25 (2): 217–229.
Hechavarria, D. M., and P. D. Reynolds. 2009. "Cultural Norms & Business Start-ups: The Impact of National Values on Opportunity and Necessity Entrepreneurs." *International Entrepreneurship and Management Journal* 5 (4): 417–437.
Honig, B. 2004. "Entrepreneurship Education: Toward a Model of Contingency-based Business Planning." *Academy of Management Learning and Education* 3 (3): 258–273.
Hood, J. N., and J. E. Young. 1993. "Entrepreneurship's Requisite Areas of Development: A Survey of Top Executives in Successful Entrepreneurial Firms." *Journal of Business Venturing* 8 (2): 115–135.
Johannisson, B. 1991. "University Training for Entrepreneurship: Swedish Approaches." *Entrepreneurship and Regional Development* 3 (1): 67–82.
Kennedy, P. 2008. *A guide to Econometrics*. Malden, MA: Blackwell Publishing.
Kirby, D. A., and N. Ibrahim. 2011. "Entrepreneurship Education and the Creation of an Enterprise Culture: Provisional Results from an Experiment in Egypt." *International Entrepreneurship and Management Journal* 7 (2): 181–193.
Koellinger, P. 2008. "Why are Some Entrepreneurs More Innovative than Others?" *Small Business Economics* 31 (1): 21–37.
Laukkanen, M. 2000. "Exploring Alternative Approaches in High-level Entrepreneurship Education: Creating Micromechanisms for Endogenous Regional Growth." *Entrepreneurship and Regional Development* 12 (1): 25–47.
Lee, S. M., D. Chang, and S. B. Lim. 2005. "Impact of Entrepreneurship Education: A Comparative Study of the US and Korea." *The International Entrepreneurship and Management Journal* 1 (1): 27–43.
Leitch, C., S. A. Hazlett, and L. Pittaway. 2012. "Entrepreneurship Education and Context." *Entrepreneurship and Regional Development* 24 (9–10): 733–740.
Levie, J., and E. Autio. 2008. "A Theoretical Grounding and Test of the GEM model." *Small Business Economics* 31 (3): 235–263.

Löbler, H. 2006. "Learning Entrepreneurship from a Constructivist Perspective." *Technology Analysis and Strategic Management* 18 (1): 19–38.
Martin, B. C., J. J. McNally, and M. J. Kay. 2013. "Examining the Formation of Human Capital in Entrepreneurship: A Meta-analysis of Entrepreneurship Education Outcomes." *Journal of Business Venturing* 28 (2): 211–224.
Marvel, M. R., J. L. Davis, and C.R. Sproul. 2016. "Human Capital and Entrepreneurship Research: A Critical Review and Future Directions." *Entrepreneurship: Theory & Practice* 40 (3): 599–626.
Meccheri, N., and G. Pelloni. 2006. "Rural Entrepreneurs and Institutional Assistance: An Empirical Study from Mountainous Italy." *Entrepreneurship and Regional Development* 18 (5): 371–392.
Mentoor, E. R., and C. Friedrich. 2007. "Is Entrepreneurial Education at South African Universities Successful? An Empirical Example." *Industry and Higher Education* 21 (3): 221–232.
Menzies, T. V., and J. C. Paradi. 2003. "Entrepreneurship Education and Engineering Students-Career path and Business Performance." *The International Journal of Entrepreneurship and Innovation* 4 (2): 121–132.
Minniti, M. 2005. "Entrepreneurship and Network Externalities." *Journal of Economic Behavior & Organization* 57 (1): 1–27.
Minniti, M., and C. Nardone. 2007. "Being in Someone Else's Shoes: the Role of Gender in Nascent Entrepreneurship." *Small Business Economics* 28 (2-3): 223–238.
Minola, T., G. Criaco, and L. Cassia. 2014. "Are Youth Really Different? New Beliefs for Old Practices in Entrepreneurship." *International Journal of Entrepreneurship and Innovation Management* 18 (2–3): 233–259. doi:10.1504/IJEIM.2014.062881.
Minola, T., D. Donina, and M. Meoli. 2016. "Students Climbing the Entrepreneurial Ladder: Does University Internationalization Pay Off?" *Small Business Economics* 47 (3): 565–587. doi:10.1007/s11187-016-9758-1.
Morris, M. H., D. F. Kuratko, M. Schindehutte, and A. J. Spivack. 2012. "Framing the Entrepreneurial Experience." *Entrepreneurship Theory and Practice* 36 (1): 11–40.
Mueller, S., and A. R. Anderson. 2014. "Understanding the Entrepreneurial Learning Process and its Impact on Students' Personal Development: A European Perspective." *The International Journal of Management Education* 12 (3): 500–511.
Mustar, P. 2009. "Technology Management Education: Innovation and Entrepreneurship at MINES ParisTech, a Leading French Engineering School." *Academy of Management Learning and Education* 8 (3): 418–425.
Naia, A., R. Baptista, C. Januário, and V. Trigo. 2014. "A Systematization of the Literature on Entrepreneurship Education: Challenges and Emerging Solutions in the Entrepreneurial Classroom." *Industry and Higher Education* 28 (2): 79–96.
Neck, H. M., and P. G. Greene. 2011. "Entrepreneurship Education: Known Worlds and New Frontiers." *Journal of Small Business Management* 49 (1): 55–70.
Oosterbeek, H., M. van Praag, and A. Ijsselstein. 2010. "The Impact of Entrepreneurship Education on Entrepreneurship Skills and Motivation." *European Economic Review* 54 (3): 442–454.
Origo, F. 2009. "Flexible Pay, Firm Performance and the Role of Unions. New Evidence from Italy." *Labour Economics* 16 (1): 64–78.
Parker, S. C. 2013. "Do serial Entrepreneurs Run Successively Better-performing Businesses?" *Journal of Business Venturing* 28 (5): 652–666.
Peterman, N. E., and J. Kennedy. 2003. "Enterprise Education: Influencing Students' Perceptions of Entrepreneurship." *Entrepreneurship Theory and Practice* 28 (2): 129–144.
Piaget, J. 1950. *The Psychology of Intelligence*. London: Routledge and Kegan.
Piperopoulos, P., and D. Dimov. 2015. "Burst Bubbles or Build Steam? Entrepreneurship Education, Entrepreneurial Self-Efficacy, and Entrepreneurial Intentions." *Journal of Small Business Management* 53 (4): 970–985.
Pittaway, L., and J. Cope. 2007a. "Entrepreneurship Education: A Systematic Review of the Evidence." *International Small Business Journal* 25 (5): 479–510.
Pittaway, L., and J. Cope. 2007b. "Simulating Entrepreneurial Learning Integrating Experiential and Collaborative Approaches to Learning." *Management Learning* 38 (2): 211–233.

Pittaway, L., and R. Thorpe. 2012. "A Framework for Entrepreneurial Learning: A Tribute to Jason Cope." *Entrepreneurship and Regional Development* 24 (9–10): 837–859.
Politis, D. 2005. "The Process of Entrepreneurial Learning: A Conceptual Framework." *Entrepreneurship Theory and Practice* 29 (4): 399–424.
Rabe-Hesketh, S., and A. Skrondal. 2008. *Multilevel and Longitudinal Modeling Using Stata*. College Station, TX: STATA Press.
Rauch, A., and W. Hulsink. 2015. "Putting Entrepreneurship Education Where the Intention to Act Lies: An Investigation Into the Impact of Entrepreneurship Education on Entrepreneurial Behavior." *Academy of Management Learning & Education* 14 (2): 187–204.
Redman, W. 1994. *Portfolios for Development: A Guide for Trainers and Managers*. London: Kogan Page.
Saeed, S., S. Y. Yousafzai, M. Yani-De-Soriano, and M. Muffatto. 2015. "The Role of Perceived University Support in the Formation of Students' Entrepreneurial Intention." *Journal of Small Business Management* 53 (4): 1127–1145.
Sánchez, J. C. 2011. "University Training for Entrepreneurial Competencies: Its Impact on Intention of Venture Creation." *International Entrepreneurship Management Journal* 7 (2): 239–254.
Sánchez, J. C. 2013. "The Impact of an Entrepreneurship Education Program on Entrepreneurial Competencies and Intention." *Journal of Small Business Management* 51 (3): 447–465.
Shah, S. K., and E. C. Pahnke. 2014. "Parting the Ivory Curtain: Understanding How Universities Support a Diverse Set of Startups." *The Journal of Technology Transfer* 39 (5): 780–792.
Shinnar, R., M. Pruett, and B. Toney. 2009. "Entrepreneurship Education: Attitudes Across Campus." *Journal of Education for Business* 84 (3): 151–159.
Sieger, P., and T. Minola. 2016. "The Family's Financial Support as a 'poisoned gift': A Family Embeddedness Perspective on Entrepreneurial Intentions." *Journal of Small Business Management*. DOI: 10.1111/jsbm.12273 (Advance online publication: http://onlinelibrary.wiley.com/doi/10.1111/jsbm.12273/full)
Sieger, P., and E. Monsen. 2015. "Founder, Academic, or Employee? A Nuanced Study of Career Choice Intentions." *Journal of Small Business Management* 53 (6): 30–57.
Souitaris, V., S. Zerbinati, and A. Al-Laham. 2007. "Do Entrepreneurship Programmes Raise Entrepreneurial Intention of Science and Engineering Students? The Effect of Learning, Inspiration and Resources." *Journal of Business Venturing* 22 (4): 566–591.
Toft-Kehler, R., K. Wennberg, and P. H. Kim. 2014. "Practice Makes Perfect: Entrepreneurial-experience Curves and Venture Performance." *Journal of Business Venturing* 29 (4): 453–470.
Toutain, O., and A. Fayolle. 2008. "Compétences entrepreneuriales et pratiques d'accompagnement: approche exploratoire et modélisation." [Entrepreneurial Competence and Supporting Practices: An Exploratory Approach and Model.] *Marché et organisations* 6 (1): 31–72.
Unger, J. M., A. Rauch, M. Frese, and N. Rosenbusch. 2011. "Human Capital and Entrepreneurial Success: A Meta-analytical Review." *Journal of Business Venturing* 26 (3): 341–358.
Urbano, D., and M. Guerrero. 2013. "Entrepreneurial Universities Socioeconomic Impacts of Academic Entrepreneurship in a European Region." *Economic Development Quarterly* 27 (1): 40–55.
Van de Ven, A. H., and P. E. Johnson. 2006. "Knowledge for Theory and Practice." *Academy of Management Review* 31 (4): 802–821.
Van der Zwan, P., I. Verheul, R. Thurik, and I. Grilo. 2013. "Entrepreneurial Progress: Climbing the Entrepreneurial Ladder in Europe and the United States." *Regional Studies* 47 (5): 803–825.
Volery, T., S. Müller, F. Oser, C. Naepflin, and N. del Rey. 2013. "The Impact of Entrepreneurship Education on Human Capital at Upper-Secondary Level." *Journal of Small Business Management* 51 (3): 429–446.
Walter, S. G., and D. Dohse. 2012. "Why Mode and Regional Context Matter for Entrepreneurship Education." *Entrepreneurship and Regional Development* 24 (9–10): 807–835.
Walter, S. G., K. P. Parboteeah, and A. Walter. 2013. "University Departments and Self-Employment Intentions of Business Students: A Cross-level Analysis." *Entrepreneurship Theory and Practice* 37 (2): 175–200.
Wennberg, K., J. Wiklund, and M. Wright. 2011. "The Effectiveness of University Knowledge Spillovers: Performance Differences between University Spinoffs and Corporate Spinoffs." *Research Policy* 40 (8): 1128–1143.

Wilson, G., and P. McCrystal. 2007. "Motivations and Career Aspirations of MSW Students in Northern Ireland." *Social Work Education* 26 (1): 35–52.
You, J., H. H. Fung, and D. M. Isaacowitz. 2009. "Age Differences in Dispositional Optimism: A Cross-cultural Study." *European Journal of Ageing* 6 (4): 247–252.
Zantow, K., D. S. Knowlton, and D. C. Sharp. 2005. "More than Fun and Games: Reconsidering the Virtues of Strategic Management Simulations." *Academy of Management Learning and Education* 4 (4): 451–458.
Zellweger, T., P. Sieger, and F. Halter. 2011. "Should I Stay or Should I Go? Career Choice Intentions of Students with Family Business Background." *Journal of Business Venturing* 26 (5): 521–536.